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ABSTRACT

Intended to provide a model for organizing vocational instructional content, this curriculum guide consists of information pertinent to conducting a postsecondary level course for training medical lab technicians. While the guide is primarily oriented towards the classroom, whether as a primary resource or as a supplement to other teaching methods, it may also assist administrators, counselors, and lay people involved in local school systems. Following an introductory discussion of state and local philosophy and objectives underlying vocational education, occupational information is provided concerning medical laboratory technicians. Presented next are a medical laboratory task index and unit guides. A medical laboratory technician course outline is presented along with a discussion of medical laboratory technician curriculum structure. Various student records are supplied. Examined next are facility layouts for both group and individualized instruction. The three appendixes to the guide contain a list of instructional resources and resource addresses, material for use in working with special needs students, and definitions. (MN)

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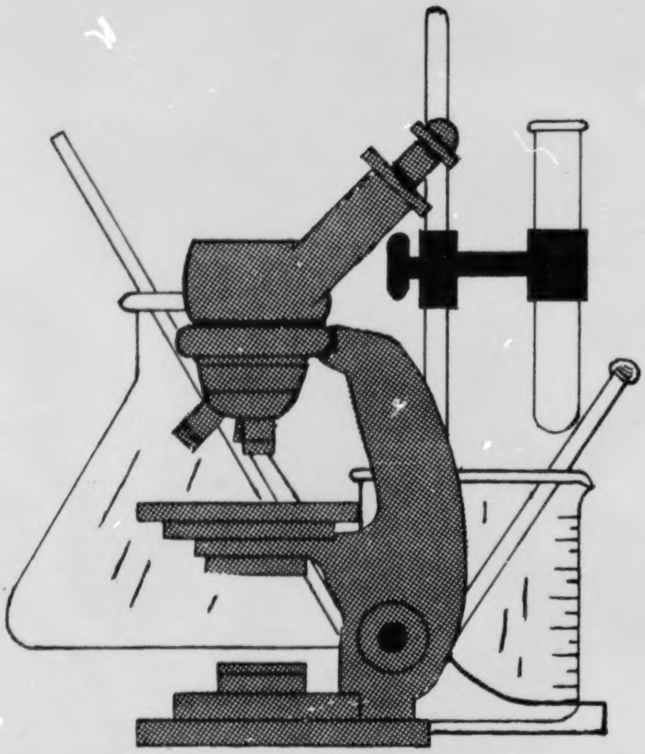

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CURRICULUM GUIDE

Georgia Department of Education

MEDICAL LAB TECHNICIAN

Developed Under Contractual Agreement with

Division of Program Development
Office of Vocational Education
Georgia Department of Education
Atlanta, Georgia 30334
Charles McDaniel, State Superintendent of Schools
1981

MEDICAL LAB TECHNICIAN

Developed By
The University of Georgia

Under the Direction of
Dr. Paul Scott
Vocational Education Materials Center
Division of Vocational Education
College of Education

Dr. George L. O'Kelley, Jr.
Division Chairman

MEDICAL LABORATORY TECHNICIAN

Bruce Simpson, Health Series Editor

DEVELOPERS

Bruce Simpson	Principal Developer
Susan Hoehn	Technical Writer
Sheila Grant	Technical Writer
Beverly J. Fitzpatrick	Project II Coordinator

CONTRIBUTORS

C. Paul Scott	Writer, Special Needs
Rhonda Hefner Packer	Editor/Production

GRAPHICS

Calvin Pelfrey	Graphic Technician

TYPISTS

Teresa Whitehead	Project Secretary
Gerry DeWald	Typist
Janie Duceatt	Typist
Marchia Elder	Typist
Carolyn Graham	Typist
Janice Martin	Typist
Gay Weaver	Typist
Frankie Wright	Typist
Wanda Wright	Typist

Division of Vocational Education
College of Education
University of Georgia. Athens, Ga.

POLICIES AND PROCEDURES FOR THE CENTER

PURPOSE OF THE CENTER

The Vocational Education Materials Center functions within the division of Vocational Education, University of Georgia. This Center operates under grants from the U.S. Office of Education, and the Georgia State Department of Education with the support of the College of Education. The Center is comprehensive in its commitment and approach to the development and dissemination of materials in the broad field of Vocational Education.

The purpose of the Center is to increase the capability of Georgia's delivery system for Vocational Education. Specifically, the Center is committed to:

1. Develop materials to assist in the implementation of proposed curricula and to enhance the teaching Vocational Education.

2. Conduct and report curriculum research related to Vocational Education.

3. Provide a production and dissemination center to Vocational Education materials.

4. Provide direct experiences in curriculum development and diffusion for advanced graduate stduents.

5. Enable faculty members to participate in the development and implementation of a variety of curriculum materials.

Dr. G.L. O'Kelley, Jr.; Chairman
Division of Vocational Education
628 Aderhold Hall
University of Georgia
Athens, Georgia 30602

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PURPOSE AND UTILIZATION OF THE CURRICULUM GUIDES

The purpose of this curriculum guide is to provide a suggested model for organizing vocational instructional content. In many cases, more material is available than may be needed, there fore, an instructor will need to adapt the content to meet his/her program needs.

While the guide is primarily oriented towards the classroom, whether as a primary resource or as a supplement to other teaching materials; it may also assist administrators, counselors and lay people involved in local school systems. The following outline provides an overview of the various ways these groups may utilize the curriculum guides.

a) Vocational teachers.

1. Provide a guide for organizing their program of instruction,
2. Assist in establishing program objectives,
3. Serve as a curriculum materials resource guide,
4. Improve communications with employers and advisory committees
5. Facilitate competency based instruction,
6. Facilitate either group or self-paced instruction,
7. Include content by quarter and semester,
8. Cross-reference with existing state developed instructional materials (PLACE packages and post secondary I.I.).

b) Vocational supervisors and administrators.

1. Assist in defining the scope and content of their programs,
2. Provide a means to improve curriculum management functions,
3. Serve as a guide for admissions and job placement functions,
4. Improve communications with employers and advisory committees.

c) Counseling and guidance staff.

1. Provide a data base for counseling and guidance personnel,
2. Identify student exit points (Career Options),
3. Serve as guide for admissions and job placement,

4. Correlate with new State Board of Education graduation requirements,
5. Provide specific content sequencing by quarter and semester for student scheduling,
6. Provide (a) curriculum options for the disadvantaged handicapped student, (b) curriculum modifications for SPECIAL NEEDS students, (c) typical admission requirements for regular and SPECIAL NEEDS students.

(d) Local Curriculum Coordination Committees.

1. Serve as a guide in working out articulation arrangements,
2. Improve definitions of the relationship between secondary clusters and post secondary specialized programs.

Vocational teachers, supervisors and administrators, counseling and guidance staff and local curriculum coordination committees will be primary users of this guide, however, the use of the guide is not limited to these groups, but by any and all groups directly related in designing a vocational curriculum.

-Foreword-

It has been the privilege of the Division of Vocational Education, University of Georgia, to participate in the development of 48 curriculum guides for Georgia vocational education programs. This work was sponsored by the Division of Program Development, Office of Vocational Education, State Department of Education. The completion of these guides meets a long standing need to provide a comprehensive curriculum overview of the vocational education programs available in Georgia schools. This developmental activity involved one of the largest professional staffs ever assembled for such work. Numerous teachers, teacher educators and state staff members have either written parts of the guides or served on the field review teams. These professionals were supported by a myriad of technical people and a host of typists who literally worked from dawn to dusk to ensure that the guides were produced in a timely fashion.

Be assured that this guide is not intended to be your curriculum or the curriculum of any school. The purpose of this project staff, and I am sure of the state OVE staff, is to offer a guide with supporting resources and teaching ideas from which the vocational instructor can extract a curriculum that meets local needs. The guide, however, does simplify curriculum decisions concerning sequencing and the selection of resources and media support.

The Task Linkage Project and appropriate V'TECS catalogs were used as the beginning point for this guide and all of the others. To assure that these task listings were directly related to Georgia vocational education programs and industry, they were subjected to additional study and review by appropriate teachers.

At some point in the future, this guide will need to be revised. To ensure that such a revision truly reflects the needs of Georgia's vocational education programs, the developers need your reactions, comments and ideas. We will also be interested in how you use this guide. Let us hear from you.

Paul Scott
Curriculum Guide Projects I & II

SECTION I

PHILOSOPHY, PURPOSE & OBJECTIVES

SECTION I

Section I Content List

State Philosophy and Goals
Local Philosophy and Goals

Section I provides an overview of the philosophies, purposes and goals for vocational education in the State of Georgia. These are applied to vocational education at the postsecondary level, however, it is recognized that more specific philosophies, purposes and goals will be applicable depending on the character of the local program.

VOCATIONAL EDUCATION IN GEORGIA

A. PHILOSOPHY

The Georgia Board of Education perceives vocational education as a vital component in the education of the young and adult citizens of this State. Appropriate programs of vocational education and ancillary services should be made readily available to individuals in middle schools, vocational divisions of junior colleges, vocational centers, the Quick Start program and other adult programs designed to train or retrain workers for useful and satisfying employment.

Special services and assistance must be provided to those who need it in order to participate or benefit from vocational education. This includes women, minorities, the displaced homemaker and other displaced workers, those with limited English-speaking ability, the disadvantaged and the handicapped.

Since men and women spend the greater part of their lives at some form of work, the State should provide opportunities for all its citizens to develop the knowledge, skills and attitudes necessary for them to secure personally satisfying and socially useful employment.

B. PURPOSE

The purpose of vocational education shall be to improve the economic well-being of Georgia citizens by preparing individuals, through organized learning experiences, to select, obtain and advance in recognized occupations.

POSTSECONDARY VOCATIONAL EDUCATION

A. PURPOSE

The purpose of postsecondary vocational-technical education in Georgia is to improve the economic well-being of adult citizens by providing access to high quality vocational-technical training for skilled and semi-skilled occupations, for improvement of existing skills or for retraining in a new occupation.

B. OBJECTIVES

1. To provide vocational-technical education programs and ancillary services commensurate with the needs and interests of students and available job opportunities.

2. To provide vocational-technical education programs which are current with the state-of-the-art, competency-based, and offer multiple exit points to accommodate the students' occupational objectives.

3. To provide vocational-technical education programs which are articulated with available high school counterparts, to facilitate an easy transition from secondary to postsecondary levels without loss of credit.

4. To provide vocational-technical education programs such that 75% of those individuals who leave or complete a program of occupational preparation will find employment in the field, or a related field, for which trained.

5. To provide those guidance, counseling, financial aid, evaluative, job placement, remedial and other supportive programs and services needed by students to enroll, complete a program and become, or remain, employable in a skilled or semi-skilled occupation.

6. To provide needed assistance to special populations to include women, minorities, limited English-speaking, the displaced homemaker and other displaced workers, the disadvantaged and the handicapped.

7. To provide vocational-technical education programs for full-time and part-time students on campus during the day as well as the evening hours, and to provide appropriate programs for full-time and part-time students off campus in businesses and industries, comprehensive high schools and other locations within the respective schools' service areas.

8. To serve as a center for the delivery of postsecondary and adult vocational-technical education programs and services for the community and assigned service area.

STATEMENT OF LOCAL SYSTEM PHILOSOPHY, PURPOSE AND OBJECTIVES FOR VOCATIONAL EDUCATION

(This page is intentionally left blank so that local systems may insert their copy of philosophy, purpose and goals for vocational education.)

SECTION II

OCCUPATIONAL INFORMATION

SECTION II

Section II Content List

Employability Skills
Medical Laboratory Technician Occupational Description
Medical Laboratory Technician Program Objective
Definition of the D.O.T. Code
Description of Medical Laboratory Technician D.O.T.

The major goal of vocational education in Georgia is to prepare individuals, through organized learning experiences, to select, obtain and advance in recognized occupations. Section II provides an overview of employability skills that are desirable in any occupation and relates their significance to the specific occupational area of Medical Laboratory Technician.

The Medical Laboratory Technicial Program Objective contains the specific occupational title. This occupational title is further explained in the description of the occupational exit points. The concentration of the program is based on these tasks.

EMPLOYABILITY SKILLS

Employability skills exert a great deal of influence on a person's ability to get and keep a job. Surveys indicate that more people lose their jobs because of poor attitudes toward their job than for lack of job skills. For this reason it is important that information concerning the following employability skills be provided as an ongoing part of the program.

1. Getting a job
    a. Filling out job applications
    b. Developing a resume
    c. Preparing for a job interview

2. Keeping a job
    a. Be on time and regular in attendance
    b. Maintain a fair share of the work-load
    c. Work without supervision
    d. Meet production schedules
    e. Properly care for and use equipment
    f. Dress appropriately for the job
    g. Maintain good personal hygiene
    h. Develop and maintain good communication with supervisors and co-workers

A recent study sponsored by the Illinois Department of Adult, Vocational and Technical Education and conducted by the University of Illinois, "Survival Skills: Mastering the Human Aspects of Work", has identified twelve topics that might be developed into instructional modules for teaching occupational survival skills. The author, Robert E. Nelson, outlines these topics listed below and on the next page, each followed by a general objective which indicates the relationship between the topic and the survival skills required to maintain a job.

*"1. Working in an Organization: To familiarize students with the reasons for the formation of organizations and the common characteristics of organizations.
2. Understanding Self and Others: To have students develop insights into causes of human behavior and learn to interpret their own behavior and the behavior of other.

3. Motivation for Work: To have students develop and understanding of motivations into the work they perform.
4. Interpersonal Relations: To have students develop concepts and skills in interpersonal relations and apply them to work situations.
5. On-the-Job Communication: To have students understand the importance of effective communication and learn ways of communicating effectively on the job.
6. Using Creativity on the Job: To make students aware of their creative potential and to practice using their creative ability in hypothetical on-the-job situations.
7. Authority and Responsibility: To have students develop an understanding of the concepts of authority, power, influence, and responsibility as they apply to work situations.
8. Problem Solving: To have students develop skill in applying problem solving to their work.
9. Coping with Organizational Change: To make students aware of the process of organizational change and the techniques for coping with organizational change.
10. Coping with Organizational Conflict: To make students aware of the sources and types of conflicts encountered on the job and recognize ways of coping with conflicts in an organization.
11. Leadership: To have students recognize the need for leadership in work groups and increase their understanding of the leadership role in work situations.
12. Adapting and Planning for the Future: To have students develop perspectives of work in the future and the ability to plan for anticipated changes in their work roles."

*Abstracted from the article, "Survival Skills: Mastering the Human Aspects of Work," by Robert E. Nelson, American Vocational Journal, November 1977.

DESCRIPTION OF OCCUPATION*

Nature of the Work

Laboratory tests play an important part in the detection, diagnosis, and treatment of many diseases. Medical laboratory workers, often called clinical laboratory workers, include three levels: Medical technologists, technicians, and assistants. They perform tests under the general direction of pathologists (physicians who diagnose the causes and nature of disease) and other physicians, or scientists who specialize in clinical chemistry, microbiology, or the other biological sciences. Medical laboratory workers analyze blood, tissues, and fluids in the human body by using precision instruments such as microscopes and automatic analyzers.

Medical laboratory technicians, who generally require 2 years of postsecondary school training, perform a wide range of tests and laboratory procedures that require a high level of skill but not the in-depth knowledge of highly trained technologists. Like technologists, they may work in several areas or specialize in one field.

Working Conditions

Medical laboratory personnel generally work a 40-hour week. Those working in a hospital can expect some evening and weekend duty. Laboratory workers may spend a great deal of time on their feet.

Laboratories generally are well lighted and clean. Although unpleasant odors and specimens of diseased tissue often are present, few hazards exist of proper methods of sterilization and handling of specimens, materials, and equipment are used.

Places of Employment

About 210,000 persons worked as medical laboratory workers in 1978. Most medical laboratory personnel work in hospitals. Others work in independent laboratories, physicians' offices, clinics, public health agencies, pharmaceutical firms, and research institutions. Laboratory facilities generally are concentrated in metropolitan areas.

In 1978, Veterans Administration hospitals and laboratories employed about 2,000 medical laboratory technicians. Others worked for the Armed Forces and the U.S. Public Health Service.

Training, Other Qualifications, and Advancement

Medical laboratory technicians acquire their training in a variety of educational settings. Many attend junior or 4-year colleges and universities for 2 years. Some are trained in the Armed Forces. Other technicians receive training in private or nonprofit vocational and technical schools. In 1978, the CAHEA accredited 72 of these programs, and the Accrediting Bureau of Health Education Schools accredited 31.

Accuracy, dependability, and the ability to work under pressure are important personal characteristics for a medical laboratory worker. Manual dexterity and normal color vision are highly desirable.

Persons interested in a medical laboratory career should use considerable care in selecting a training program. They should get information about the kinds of jobs obtained by graduates, educational costs, the accreditation of the school, the length of time the training program has been in operation, instructional facilities, and faculty qualifications.

Employment Outlook

Employment opportunities for medical laboratory workers are expected to be favorable through the 1980's. Employment of these workers is expected to expand faster than the average for all occupations as physicians make wider use of laboratory tests in routine physical checkups and in the diagnosis and treatment of disease. Indirectly influencing growth of the field are population growth, greater health consciousness, and expansion of prepayment programs for medical care that make it easier for people to pay for services.

The use of automated laboratory test equipment is expected to lead to an increase in the number of medical laboratory technicians relative to technologists. Through technological advances, technicians can operate equipment to perform tests that previously required the skill of a technologist.

Technologists will be needed to fill supervisory postions in all laboratories. In addition to openings resulting from increased demand for these workers many jobs will become available each year because of the need to replace medical workers who die, retire, or leave the field for other reasons.

Sources of Additional Information

Information about education and training for medical laboratory technicians meeting standards recognized by the American Medical Association, the U.S. Office of Education, or both, as well as career information on these fields is available from:

American Society of Clinical Pathologists, Board of Registry,
P.O. Box 11270, Chicago, IL 60612.

Accrediting Bureau of Health Education Schools, Oak Manor Office,
29089 U.S. 20 West, Elkhart, IN 46514.

For information about other technician training programs, contact:

International Society for Clinical Laboratory Technology, 818
Olive St., St. Louis, MO 63101.

For a list of training programs for medical technologists, technicians, and assistants that are approved by the American Medical Association, Write:

Department of Allied Health Evaluation, American Medical
Association, 535 N. Dearborn St., Chicago, IL 60610.

For a list of training programs for medical laboratory technicians accredited by the Accrediting Bureau of Health Education Schools, write:

Secretary-ABHES, 29089 U.S. 20 West, Elkhart, IN 46514.

Information about employment opportunities in Veterans Administration hospitals is available from the Office of Personnel (054E), Veterans Administration, Washington, D.C. 20420.

Information about clinical and research employment opportunities with the National Institutes of Health is available from the Clinical Center, National Institutes of Health, Bethesda, MD 20205.

*Occupational Outlook Handbook, 1980-81 edition

MEDICAL LABORATORY TECHNICIAN PROGRAM OBJECTIVE

Given appropriate instruction, as suggested by this guide, a student completing the program should demonstrate entry level skills of Medical Laboratory Technician in the areas of knowledge, theoretical structure, tool usage, diagnostic ability, related supportive skills and occupational survival skills.

As the student progresses through the program, sufficient competencies will be acquired to enable the student to enter the occupational field at the following D.O.T. Codes.*

Medical Laboratory Technician (D.O.T. Code 078.381-014)

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*Dictionary of Occupational Titles

DEFINITION OF D.O.T. CODE*

As a result of technological, economic and sociological influences, nearly every job in the economy is performed slightly differently from any other job. Every job is also similar to a number of other jobs. In order to look at the millions of jobs in an organized way, job titles are designated a 9-digit occupational code. Each set of three digits in the D.O.T. Code has a specific purpose or meaning that differentiates it from all other codes.

The first three digits of the D.O.T. Code identify a particular occupational group. In the code 652.382-010, the first digit indicates an occupational category. The second digit refers to a division within the occupational category. The third digit defines a specific occupational group within a division.

The middle three digits of the D.O.T. Code 652.382-010 are the worker function rating of the tasks performed in the occupation. Every job requires a worker to function, to some degree, in relation to data, people and things. A separate digit expresses the worker's relationship to each of these three groups. Worker functions involving more complex responsibility and judgment are assigned lower numbers while functions which are less complicated have high numbers.

The last three digits of the D.O.T. Code 652.382-010 indicate the alphabetical order of titles within 6-digit code groups. They serve to differentiate a particular occupation from all others. A number of occupations may have the same first six digits, but no two D.O.T. Code can have the same nine digits.

*Dictionary of Occupational Titles, 1977 ed.

DESCRIPTION OF OCCUPATIONAL EXIT POINTS*

078.381-014 MEDICAL-LABORATORY TECHNICIAN (medical ser.)
medical technician.

Performs routine tests in medical laboratory for use in treatment and diagnosis of disease: Prepares tissue samples for PATHOLOGIST (medical ser.). Takes blood samples. Executes such laboratory tests as urinalysis and blood counts. Makes quantitative and qualitative chemical and biological analyses of body specimens, under supervison of MEDICAL TECHNOLOGIST (medical ser.) or laboratory director. May be designated according to field of specialization as BLOOD-BANK TECHNICIAN (medical ser.); CYTOTECHNICIAN (medical ser.); HEMATOLOGY TECHNICIAN (medical ser.); SEROLOGY TECHNICIAN (medical ser.); TISSUE TECHNICIAN (medical ser.).

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*Dictionary of Occupational Titles, 1977 ed.

SECTION III

UNIT GUIDES

SECTION III

Section III Content List

Unit Guide Description
Suggested Sequence of Unit Guides

In Section II, the relationship between the occupational area and program tasks was introduced. Section III continues this development by presenting, for each task, a unit guide for instructional planning and execution.

The instruction of specific tasks is central to vocational education. However, the value of a single task/competency to the student as a prospective member of the workforce is dependent upon the way in which that task/competency is related to other tasks and to the entire occupational area. Therefore, the Medical Laboratory Technician Program Task Listing provides a sample organizational model for sequencing the instruction of program tasks.

UNIT GUIDES DESCRIPTION

In this section the tasks to be taught in each course are presented in sequential order. Each task is listed on a separate page so that it may be taken out of the guide for daily lesson planning or regrouped with order tasks to fit the individual teacher's preference for teaching order. The task pages may be used for planning and executing group instruction or for individualized instruction. Each page in the UNIT GUIDES section contains the following information:

TASK: This is a short and concise statement of the task to be taught.

PERFORMANCE OBJECTIVE: The performance expected of the student after completing the unit is stated in stem form, without a specific statement of all conditions, equipment and performance standard (these are listed in a criterion referenced measure in the Evaluation section of the task page).

INSTRUCTIONAL ACTIVITIES: Suggested learning activities are presented. These activities include providing information, demonstration, practical applications and projects.

INSTRUCTIONAL MATERIALS: Suggested materials for carrying out the instructional activities are listed. these include textbooks, audiovisuals and equipment. Textbooks are referenced by author and title with the complete reference contained in the textbook list in the Instructional Resources section.

EVALUATION: This section contains a criterion referenced measure and reference to any test items or other evaluation measures that are available to teacher.

CLASS/LAB HOURS: The estimated time for completion of the instructional activities and the evaluation are indicated in both classroom and lab hours. Total instructional time would be the sum of these.

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MICROBIOLOGY PROCEDURES

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TASK

0-1 Orienting students to school policies and the medical laboratory profession

PERFORMANCE OBJECTIVE

Demonstrate an understanding of school policies, ethics, certification and duties of the profession and safety and first aid.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. School policies
b. Improving study habits
c. Curriculum
d. Communication skills
e. Available resources
f. Hospitals - types and services offered
g. Laboratories
    1. Hospital departments
    2. Industrial
    3. Private physician
h. Profession
    1. Certification
    2. Accreditation
    3. Licensure
    4. Career ladder opportunities
    5. Professional associations
    6. Ethics
i. Interpersonal relationships
j. Applying for and maintaining a job
k. Safety and first aid
l. Library resources
m. Consumer life skills

INSTRUCTIONAL MATERIALS

Textbooks:

a. Lee, The Lab Aide
b. American Red Cross

LAB HOURS	
CLASS HOURS	15

EVALUATION (O-1)

Given the necessary instruction and information, the student will demonstrate an understanding of school policies, ethics, certification and duties of the profession, safety and first aid. Evaluation will be by written examination based on criteria established by the instructor. Additional evaluations will be made throughout the course.

TASK

O-2 Performing calculations and conversions using the metric and English measurement systems

PERFORMANCE OBJECTIVE

Demonstrate the ability to use metric and English measurements interchangeably.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Basic units of English and metric system
b. Greek prefixes and their meanings
c. Common metric and English equivalents
d. Method of conversion
    1. Ratio and proportion
    2. Cross multiply

Laboratory Practice:

Have learner practice problems converting metric and English measurements.

INSTRUCTIONAL MATERIALS

Textbooks:

Any basic chemistry book

LAB HOURS	
CLASS HOURS	6

EVALUATION (O-2)

Given the necessary instruction and information, the student will use metric and English measurements interchangeably. Evaluation will be by written examination based on criteria established by the instructor.

TASK

O-3 Converting temperatures from all three recognized temperature scales

PERFORMANCE OBJECTIVE

Demonstrate the ability to use all three recognized temperature scales interchangeably.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Comparing kelvin, centigrade and fahrenheit scales
   1. Boiling point
   2. Freezing point
   3. Absolute zero

b. Formulas of conversion and basic math concepts needed to calculate

c. Practice problems

Laboratory Practice:

Have learner practice working conversion problems involving the three recognized temperature scales.

INSTRUCTIONAL MATERIALS

Textbooks:

Any basic chemistry book

LAB HOURS	
CLASS HOURS	3

EVALUATION (O-3)

Given the necessary instruction and information, the student will use the three recognized temperature scales interchangeably. Evaluation will be by written examination based on criteria established by the instructor.

TASK

O-4 Cleaning glassware

PERFORMANCE OBJECTIVE

Handle and clean glassware.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Names and uses of commonly used laboratory glassware
    1. Volumetric vs. serological
    2. Graduations
    3. Calibrations
    4. Pyrex vs. Kimax
b. Cleaning glassware
    1. Soaps, disinfectants, acid
    2. Proper rinsing
    3. Drying
    4. Blood dilution pipettes
    5. Pipettes
    6. Importance

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice cleaning a variety of glassware.

INSTRUCTIONAL MATERIALS

Equipment and Supplies:

a. A variety of glassware used in a medical laboratory
b. Equipped area for cleaning glassware
c. Soap
d. Disinfectant
e. Acid

LAB HOURS	5
CLASS HOURS	

EVALUATION (O-4)

Given dirty glassware and the necessary equipment and supplies, the student will clean the glassware. All glassware items must be free of any residue and maintained in good condition. Periodic evaluations will be made throughout the course.

TASK

O-5 Operating centrifuge

PERFORMANCE OBJECTIVE

Operate centrifuges.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Uses of centrifuges
b. Types of centrifuges
    1. Anglehead
    2. Horizontal head
    3. Serofuge
    4. Microhematocrit
d. Procedure for operation
    1. Balance
    2. Advance speed slowly
    3. Set timer
    4. Proper stopping
e. Cleaning
f. Calibration

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice operating the centrifuge until all steps are mastered.

INSTRUCTIONAL MATERIALS

Textbooks:

Operator's manual

Equipment and Supplies:

a. Centrifuge
b. Test tubes

LAB HOURS	3
CLASS HOURS	

EVALUATION (O-5)

Given a centrifuge, the student will operate the centrifuge. All checklist items must be rated "acceptable."

PERFORMANCE CHECKLIST

ACTIVITY	RATING	
	Acceptable	Unacceptable
1. Speed turned to zero		
2. Given one tube, it is balanced with another		
3. Lid closed securely		
4. Timer operated correctly to start, then set for 5 minutes		
5. Speed advanced slowly to correct speed		
6. Stop procedure observed		
7. Lid not opened until centrifuge has completly stopped		
8. Calibrated rpm's properly		

TASK

O-6 Operating a microscope

PERFORMANCE OBJECTIVE

Operate and care for a microscope.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Parts of binocular microscope
b. Properly placing on stage
c. Focusing
d. Operation of controls
e. Switching objectives
f. Oil immersion
g. Use of graduated stage to identify and relocate a specific cell
h. Locating specific squares on a hemocytometer
i. Removal of slide
j. Proper care and cleaning

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice using the microscope in a variety of laboratory situations and procedures.

INSTRUCTIONAL MATERIALS

Textbooks:

Microscope manual

Equipment and Supplies:

a. Microscope
b. Slides
c. Lens paper
d. Specimens for practice

LAB HOURS	5
CLASS HOURS	

EVALUATION (O-6)

a. Given a microscope and the necessary supplies, the student will operate and care for the microscope. All checklist items must be rated "acceptable."

b. On a written examination, have learner list the important points in using and caring for the microscope.

PERFORMANCE CHECKLIST

ACTIVITY	RATING	
	Acceptable	Unacceptable
1. Properly placed stained slide on stage		
2. Focused on low power		
3. Moved slide according to directions		
a. Up and down		
b. Left and right		
4. Properly changed from 10x to 45x		
5. Properly focused 45x		
6. Properly added oil, switched to 100x		
7. Properly used stage graduation to locate a specific cell		
8. Properly removed slide		
9. Properly cleaned smear with gauze		
10. Properly cleaned 100x objective		
11. Securely placed hemocytometer on stage		
12. Located large upper right square with 10x		
13. Located large lower left square with 10x		
14. Located upper right tertiary square with 45x		
15. Located center right tertiary square with 45x		
16. Properly removed hemocytometer		
17. Write out important points in using and caring for a microscope that leaves it in clean and good order		

TASK

O-7 Performing venipuncture

PERFORMANCE OBJECTIVE

Perform venipunctures.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Justification of procedure
b. Procedure steps
c. Safety precautions
d. Isolation techniques
e. Needle gauges
f. Alternate sites

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice procedure using a training arm.

INSTRUCTIONAL MATERIALS

Textbooks:

Seivard, Hematoloty for Medical Technologist

Equipment and Supplies:

a. Training arm
b. Tourniquet
c. Alcohol (antiseptic)
d. Sterile syringe or vacuum tube, needle
e. Sterile cotton balls, gauze
f. Collection tubes
g. Adhesive bandage

LAB HOURS	7
CLASS HOURS	

EVALUATION (O-7)

Given the necessary equipment and supplies, the student will perform a venipuncture. All checklist items must be rated "acceptable."

PERFORMANCE CHECKLIST

ACTIVITY	RATING	
	Acceptable	Unacceptable
1. Equipment assembled		
2. Identified patient		
3. Checked vein, adjusted patient		
4. Prepared vacutainer, syringe		
a. Properly attached needle		
b. Inserted tube to proper line or adapter		
5. Applied tourniquet		
6. Felt vein with forefinger, pressing up and down		
7. Applied antiseptic in concentric circles, allowed to dry		
8. Quickly and smoothly inserted needle		
9. Pushed vacutainer onto needle, holding needle steady (or pulled back plunger or syringe		
10. Obtained full tube of blood, mixed if anticoagulated		
11. Changed tubes		
12. Removed tourniquet		
13. Smoothly withdrew needle, rapidly applied pressure with gauze		
14. Checked arm for bleeding - band aid if needed		
15. No hematoma		
16. Labeled blood immediately		
17. Destroyed needle		
18. Cleaned area		

TASK

O-8 Performing capillary puncture

PERFORMANCE OBJECTIVE

Perform capillary punctures.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Justification
b. Procedure
c. Safety precautions
d. Sources of error

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice procedure working with a partner.

INSTRUCTIONAL MATERIALS

Textbooks:

Seivard, Hematology for Medical Technologist

Equipment and Supplies:

a. Alcohol swab
b. Sterile cotton balls
c. Lancet
d. Capillary tubes

LAB HOURS	2
CLASS HOURS	

EVALUATION (O-8)

Given the necessary equipment and supplies, the student will perform a capillary puncture. All checklist items must be rated "acceptable."

PERFORMANCE CHECKLIST

ACTIVITY	RATING	
	Acceptable	Unacceptable
1. Materials assembled		
2. Applied antiseptic		
3. Wiped 1st drop		
4. Hemoglobin		
a. Adequate blood obtained		
b. No bubbles in pipette		
5. Hematocrit tubes - adequate blood		
obtained (at least two tubes, 2/3 full)		

TASK

O-9 Performing and plating blood dilutions

PERFORMANCE OBJECTIVE

Perform and plate blood dilutions.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Thoma pipette
   1. Calculating dilutions
   2. Cleaning procedures
b. Procedure for drawing up samples
   1. rbc
   2. wbc
   3. hgb
c. Sources of error
d. Unopettes
   1. Method
   2. Advantages
e. Hemocytometer
   1. Ruled areas for counting
   2. Care and cleaning
   3. Plating procedure
f. Procedure for hgb
   1. Cyanmethemoglobin method

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice performing procedures until ready for evaluation.

INSTRUCTIONAL MATERIALS

Textbooks:

Hyun, Ashton and Dolan, Practical Hematology

LAB HOURS	6
CLASS HOURS	

EVALUATION (O-9)

Given the necessary equipment and supplies, the student will perform and plate blood dilutions. All checklist items must be rated "acceptable." (Instructor: Use the same checklist for each procedure, using only the items applicable to the specific procedures being evaluated.)

PERFORMANCE CHECKLIST

ACTIVITY	RATING	
	Acceptable	Unacceptable
1. Proper mixing of blood		
2. Correct measurement of blood		
3. Pipette wiped correctly		
4. Blood level adjusted correctly		
5. Dilution		
a. Fairly rapid, less than 15 seconds		
b. Twisting of bulb		
c. Diluted to line		
d. No bubbles		
6. Proper shaking		
7. Discard 1/3 volume of bulb		
8. Rinsed 5 times (hgb pipette)		
9. Cleaned properly		
Hemocytometer filling		
1. Properly cleaned		
2. RBC plated correctly x 2		
3. WBC plated correctly x 2		

TASK

O-10 Operating a spectrophotometer

PERFORMANCE OBJECTIVE

Operate and care for a spectrophotometer.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Colorimetry
    1. Basic principle
    2. Percent T and O.D.
b. Cuvettes
    1. How to identify
    2. How to use properly
c. Calibration procedure
    1. Filter check
d. Coleman Jr.
    1. Diagram of parts and how light source works
    2. Controls operation
    3. Proper procedure for reading samples
    4. Care and cleaning
    5. Maintenance

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice using spectrophotometer until ready for evaluation.

INSTRUCTIONAL MATERIALS

Textbooks:

Instrument operational manual

Equipment and Supplies:

a. Spectrophotometer
b. Cuvettes
c. Water
d. Sample solution

LAB HOURS	4
CLASS HOURS	

EVALUATION (O-10)

a. Given the necessary equipment and supplies, the student will perform assigned manipulations on the Coleman Jr. II spectrophotometer.

b. An oral or written examination on controls and settings of the instrument may be administered. This evaluation will be based on criteria established by the instructor.

PERFORMANCE CHECKLIST

ACTIVITY	RATING	
	Acceptable	Unacceptable
1. Set wavelength at 610 nm.		
2. Check 100 percent T and zero until correct		
3. Check calibration filter, determine if adjustment is needed		
4. Set wavelength as requested		
5. Properly read two cuvettes of a sample solution against a cuvette of water in two minutes or less		
6. Promptly and accurately record results		
7. Used cuvette cover over all samples		
8. Blank between each sample		
9. Wiped cuvettes before reading		
10. Properly placed cuvette in holder		
11. Left instrument in good order		

TASK

O-11 Performing serial dilutions

PERFORMANCE OBJECTIVE

Perform and interpret serial dilutions.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Define serial dilution
b. Calculation of dilution factors
c. Purpose of serial dilution
d. Steps of procedure

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice performing serial silutions until ready for evaluation.

INSTRUCTIONAL MATERIALS

Textbooks:

Annino, Clinical Chemistry: Principles and Procedures

Equipment and Supplies:

a. Pipettes
b. Diluent
c. Serum
d. Test tubes

LAB HOURS	3
CLASS HOURS	

EVALUATION (O-11)

Given the necessary equipment and supplies, the student will perform a serial dilution. All checklist items must be rated "acceptable."

PERFORMANCE CHECKLIST

ACTIVITY	RATING	
	Acceptable	Unacceptable
1. Correctly calculated dilutions		
2. Correctly calculated dilution factors		
3. Properly set up and labeled tubes		
4. Properly measured diluent		
5. Properly measured serum		
6. Properly serially diluted		

TASK

O-12 Performing pipetting

PERFORMANCE OBJECTIVE

Perform pipetting procedures.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Pipettes
    1. Serological
    2. Volumetric
    3. T.D.
    4. T.C.
    5. Blow out
b. Meniscus - how to read
c. Pipetting technique
d. Avoiding contamination of test and stock reagents
e. Bulbs
f. Cleaning

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice pipetting a variety of situations until ready for evaluation.

INSTRUCTIONAL MATERIALS

Equipment and Supplies:

a. Liquid to be measured
b. 5 ml. serological pipette
c. 2 ml. volumetric pipette
d. 1 ml. serological pipette
e. Bulbs
f. 50 ml. volumetric
g. 25 ml. volumetric flask
h. Stoppers

LAB HOURS	2
CLASS HOURS	

EVALUATION (O-12)

Given access to the necessary equipment and supplies, the student will assemble the equipment and perform pipetting procedures. All checklist items must be rated "acceptable."

PERFORMANCE CHECKLIST

ACTIVITY	RATING	
	Acceptable	Unacceptable
1. Pipetting technique		
a. Size and type suitable for liquid		
b. Liquid drawn just slightly above the zero mark		
c. Properly removed pipette from liquid and wiped outside		
d. Meniscus adjusted to indicated level		
e. Pipette held vertically during step d		
f. Pipette held with meniscus held at eye level during step d		
g. Properly drained pipette, blown or rinsed		
3. Properly pipette the following within three minutes from a flask into a test tube		
a. 5 ml. from a 5 ml. serological pipette		
b. 2 ml. from a 2 ml. volumetric pipette		
c. 0.8 ml. from a 1 ml. serological pipette		
4. Prepare a dilution using a 50 ml. volumetric flask		
a. Properly pipette 5 ml. of solution with a volumetric pipette		
b. Accurately dilute to flask line		
c. Correctly stopper and mix		
5. Pipette 5 ml. x 5 with a volumetric and pipette into a 25ml. volumetric flask		

TASK

O-13 Operating a double pan balance and weighing dry chemicals

PERFORMANCE OBJECTIVE

Weigh dry chemicals using a double pan balance.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Proper use of double pan balance
    1. Taring
    2. Handling weights with forceps
    3. Properly reading scales
    4. Weighing boats or paper
    5. Measuring dry chemicals without contamination of the stock reagent
    6. Proper disposal of left over chemicals

b. Procedure for using analytical balance

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice the procedure until ready for evaluation.

INSTRUCTIONAL MATERIALS

Equipment and Supplies:

a. Double-pan balance
b. 50 ml. beaker
c. Reagent
d. Analytical balance

LAB HOURS	4
CLASS HOURS	

60

EVALUATION (O-13)

Given the necessary equipment and supplies, the student will weigh a specified amount of dry chemical. All checklist items must be rated "acceptable."

PERFORMANCE CHECKLIST

ACTIVITY	RATING	
	Acceptable	Unacceptable
1. Checked for zero balance		
2. Zero balanced properly, if needed		
3. Determined where to slide weight for 1.5g of reagent and so moved it		
4. Add reagent to correct amount for 1.5g. No spills		
5. Did not contaminate stock reagent		
6. Accurately determined weight of a 50 ml. beaker		
7. Properly secured balance for storage		

TASK

IH-1 Describing basic chemistry of the body

PERFORMANCE OBJECTIVE

Describe the basic chemistry of the body.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Living matter
   1. Mass
   2. Weight
   3. Matter (structure)
   4. Energy levels and electrons in atom
   5. Valence
   6. Atomic number and mass
   7. Isotopes
b. Chemical change
   1. Elements
   2. Compounds
   3. Mixture
   4. Chemical bonds
c. Collison theory and factors determining the speed of chemical reactions
d. Selected chemical reactions
   1. Acid - base
   2. Salts
e. Inorganic compounds important in the body
   1. Water
   2. O_2
   3. NH_3
f. Characteristics of organic compounds
   1. Bonding
   2. Radicals
   3. Compounds found in the body

INSTRUCTIONAL MATERIALS

Textbooks:

Lankford, Integrated Science for Health Students

LAB HOURS	
CLASS HOURS	10

EVALUATION (IH-1)

Given the necessary information and related instruction, the student will describe the basic chemistry of the body. Evaluation will be by written examination and based on criteria specified by the instructor.

TASK

IH-1 Describing basic chemistry of the body

PERFORMANCE OBJECTIVE

Describe the basic chemistry of the body.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Living matter
   1. Mass
   2. Weight
   3. Matter (structure)
   4. Energy levels and electrons in atom
   5. Valence
   6. Atomic number and mass
   7. Isotopes
b. Chemical change
   1. Elements
   2. Compounds
   3. Mixture
   4. Chemical bonds
c. Collison theory and factors determining the speed of chemical reactions
d. Selected chemical reactions
   1. Acid - base
   2. Salts
e. Inorganic compounds important in the body
   1. Water
   2. O_2
   3. NH_3
f. Characteristics of organic compounds
   1. Bonding
   2. Radicals
   3. Compounds found in the body

INSTRUCTIONAL MATERIALS

Textbooks:

Lankford, Integrated Science for Health Students

LAB HOURS	
CLASS HOURS	10

EVALUATION (IH-1)

Given the necessary information and related instruction, the student will describe the basic chemistry of the body. Evaluation will be by written examination and based on criteria specified by the instructor.

TASK

IH-2 Describing basic microbiology

PERFORMANCE OBJECTIVE

Describe microbiology and its relationship to disease.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Historical contributions of microbiology
b. Nomenclature of microbes
c. Cell
    1. Structures
    2. Functions
d. Microorganisms found on and in the body
e. How microbes cause disease
f. Types of infections
g. Resistance
h. Methods of identifying microbes

INSTRUCTIONAL MATERIALS

Textbooks:

Lankford, Integrated Science for Health Students

LAB HOURS	
CLASS HOURS	6

EVALUATION (IH-2)

Given the necessary information and related instruction, the student will describe microbiology and its relationship to disease. Evaluation will be by written examination and based on criteria specified by the instructor.

TASK

IH-3 Describing the general plan and structural units of the body

PERFORMANCE OBJECTIVE

Describe the general body plan and structural units.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Direction terms
b. Planes or sections of the body
c. Body cavities
d. Structural units
e. Cell and homeostasis
f. Tissues
g. Membranes

INSTRUCTIONAL MATERIALS

Textbooks:

Lankford, Integrated Science for Health Students

LAB HOURS	
CLASS HOURS	5

EVALUATION (HI-3)

Given the necessary information and related instruction, the student will describe the general body plan and structural units. Evaluation will be by written examination and based on criteria specified by the instructor.

TASK

III-4 Describing the nervous system and endocrine system

PERFORMANCE OBJECTIVE

Describe the nervous system and endocrine system and how they interact to maintain homeostasis.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Organization of the nervous system
b. Nerve impulse conduction
c. Specialized receptor cells
d. Spinal cord and nerves
e. Brain
f. Autonomic nervous system
g. Introduction to the endocrine system

INSTRUCTIONAL MATERIALS

Textbooks:

Lankford, Integrated Science for Health Students

LAB HOURS	
CLASS HOURS	8

EVALUATION (IH-4)

Given the necessary information and related instruction, the student will:

a. Describe the nervous system

b. Describe the endocrine system

c. Describe how the nervous system and endocrine systems interact to maintain homeostasis

Evaluation will be by written examination and based on criteria specified by the instructor.

TASK

IH-5 Describing the cardiovascular system

PERFORMANCE OBJECTIVE

Describe the cardiovascular system and blood

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Cardiovascular system
b. Circulatory system
c. Blood pressure
d. Blood
e. Disease and deficiencies of blood

INSTRUCTIONAL MATERIALS

Textbooks:

Lankford, Integrated Science for Health Students

LAB HOURS	
CLASS HOURS	6

EVALUATION (IH-5)

Given the necessary information and related instruction, the student will describe the cardiovascular system and blood. Evaluation will be by written examination and based on criteria specified by the instructor.

TASK

IH-6 Describing systems and tissues that protect the body

PERFORMANCE OBJECTIVE

Describe the systems and tissues that protect the body.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Integumentary system
b. The skin
c. Protective role of lymphatic tissue

INSTRUCTIONAL MATERIALS

Textbooks:

Lankford, Integrated Science for Health Students

LAB HOURS	
CLASS HOURS	5

EVALUATION (IH-6)

Given the necessary information and related instruction, the student will describe the systems and tissues that protect the body. Evaluation will be by written examination and based on criteria specified by the instructor.

TASK

IH-7 Describing sensory receptors and sense organs

PERFORMANCE OBJECTIVE

Describe the sensory receptors and sense organs.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Location and classification of sensory receptor cells
b. Characteristics of stimuli
c. Specialized sense organs

INSTRUCTIONAL MATERIALS

Textbooks:

Lankford, Integrated Science for Health Students

LAB HOURS	
CLASS HOURS	6

EVALUATION (IH-7)

Given the necessary information and related instruction, the student will describe the sensory receptors and sense organs. Evaluation will be by written examination and based on criteria specified by the instructor.

TASK

IH-8 Describing bones and muscles and how they produce movement

PERFORMANCE OBJECTIVE

Describe bones and muscles and how they produce movement.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Importance of movement
b. Muscular and skeletal systems
c. Classification and structure of bones
d. Roles of levers
e. Functional parts of a skeletal muscle
f. Motor units and myoneural junctions
g. Muscles of the abdomen
h. Hernia sites in the abdominal wall
i. Classes of joints (fulcrum)
j. Bursae
k. Disorders of bones, muscles, joints and bursae

INSTRUCTIONAL MATERIALS

Textbooks:

Lankford, Integrated Science for Health Students

LAB HOURS ☐
CLASS HOURS 8

EVALUATION (IH-8)

Given the necessary information and related instruction, the student will describe bones and muscles and how they produce movement. Evaluation will be by written examination and based on criteria specified by the instructor.

TASK

IH-9 Describing the regulation of the body's internal environment

PERFORMANCE OBJECTIVE

Describe the regulation of the body's internal environment.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Fluids of the body
b. Movement of fluids and electrolytes between compartments
c. Role of lymphatic system in fluid and electrolyte exchange
d. Respiratory system
e. Urinary system

INSTRUCTIONAL MATERIALS

Textbooks:

Lankford, Integrated Science for Health Students

LAB HOURS	
CLASS HOURS	10

EVALUATION (IH-9)

Given the necessary information and related instruction, the student will describe the regulation of the body's internal environment. Evaluation will be by written examination and based on criteria specified by the instructor.

TASK

IH-10 Describing digestion, absorption and assimilation of food and the elimination of body waste

PERFORMANCE OBJECTIVE

Describe the digestion, absorption and assimilation of food and the elimination of body waste.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Function of the digestive system
b. Digestion and related actions
c. Ingestion and physical breakdown of food
d. Secretion of enzymes and chemical digestion
e. Absorption of digested products
f. Metabolism of lipids, carbohydrates and proteins
g. Vitamins

INSTRUCTIONAL MATERIALS

Textbooks:

Lankford, Integrated Science for Health Students

LAB HOURS	
CLASS HOURS	8

EVALUATION (IH-10)

Given the necessary information and related instruction, the student will describe the digestion, absorption and assimilation of food and the elimination of body waste. Evaluation will be by written examination and based on criteria specified by the instructor.

TASK

IH-11 Describing the reproductive system

PERFORMANCE OBJECTIVE

Describe the reproductive system.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Female reproductive system
b. Male reproductive system
c. Gonorrhea and syphlis
d. Gametogenesis
e. Menstrual cycle
f. Fertilization
g. Restoration of 46 chromosomes and determination of sex
h. Embryologic development
i. Delivery
j. Contraceptives and birth control
k. Disorders and diseases of the reproductive system

INSTRUCTIONAL MATERIALS

Textbooks:

Lankford, *Integrated Science for Health Students*

LAB HOURS	
CLASS HOURS	8

EVALUATION (IH-11)

Given the necessary information and related instruction, the student will describe the reproductive system. Evaluation will be by written examination and based on criteria specified by the instructor.

TASK

UP-1 Recognizing the anatomy and physiology of the urinary system

PERFORMANCE OBJECTIVE

Demonstrate the ability to adapt urinalysis techniques to the anatomy and physiology of the urinary system.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Role of kidney in hemeostasis
b. Function and structure of
    1. Kidney
    2. Ureters
    3. Bladder
    4. Urethra
c. Function and structure of the hephron
    1. Glomerulus
    2. Bowman's capsule
    3. Proximal and distal convoluted tubules
    4. Collecting duct
d. Flow of urine through the kidney
e. Filtration of blood through the glomerulus
f. Identification and differentiation between reabsorption and secretion of substances in the tubules
g. Where concentration of urine occurs
h. Ultimate composition of urine
i. Define: renal threshold

INSTRUCTIONAL MATERIALS

Textbooks:

a. Davidsohn and Henry, Clinical Diagnosis by Laboratory Methods
b. Halstead, The Laboratory in Clinical Medicine
c. The Ames Company, Urodynamics

A/Vs:

Project Competence Assurance, "Urinalysis: An Educational Program," slide/tape

LAB HOURS	
CLASS HOURS	5

EVALUATION (UP-1)

Given the necessary information and related instruction, the student will demonstrate the ability to adapt urinalysis techniques to the anatomy and physiology of the urinary system. Evaluation will be by written examination and based on criteria specified by the instructor.

TASK

UP-2 Understanding the techniques of proper specimen handling

PERFORMANCE OBJECTIVE

Demonstrate a knowledge of the techniques for handling specimens properly.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Value of urinalysis as a routine medical procedure
b. Three basic steps of routine urinalysis-what you're testing for in each
c. Definitions, circumstances each is needed for, advantages and disadvantages, correct usage, methods of collection of the following types of specimens
    1. Random
    2. First-voided
    3. 24-hr.
    4. 12-hr.
    5. Post-prandial
    6. Fasting
    7. Afternoon
    8. Day
    9. Night
    10. Clean catch
    11. Catherized
    12. Super pubic stick
d. Proper urine containers
e. Obtaining specimens from babies
f. Reasons for preservatives
g. Preservative of choice for:
    1. Timed samples for quantitation
    2. Cells and casts
    3. Addis count
    4. Glucose

(Continued on back)

INSTRUCTIONAL MATERIALS

Textbooks:

a. Davidsohn and Henry, Clinical Diagnosis by Laboratory Methods
b. The Ames Company, Urodynamics

LAB HOURS	
CLASS HOURS	5

EVALUATION (UP-2)

Given the necessary information and related instruction, the student will demonstrate a knowledge of the techniques for handling specimens properly. Evaluation will be by written examination and based on criteria specified by the instructor.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

    5. VMA
    6. Porphyrins
h. Substitution of preservatives
i. Physical methods of preservation
j. Method to check a timed specimen for accurate collection

TASK

UP-3 Performing physical examinations of urine

PERFORMANCE OBJECTIVE

Perform a physical examination of urine.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Color, transparency and odor of normal urine
b. Substances or conditions that cause change in color, transparency or odor
c. Significance of foam and its color
d. Normal values for urine volume - single and 24 hour specimens
e. Definitions and causes of polyuria, oliguria, anuria
f. Body processes that yield a loss of water
g. Solute

(Continued on back)

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice measuring performing physical examination of a variety of urine specimens.

INSTRUCTIONAL MATERIALS

Textbooks:

a. The Ames Company, Urodynamics
b. Davidsohn and Henry, Clinical Diagnosis by Laboratory Methods

Equipment and Supplies:

a. Urine
b. Urinometers
c. Refractometers
d. Graduated cylinders

LAB HOURS	4
CLASS HOURS	2

EVALUATION (UP-3)

a. Given a patient's urine and the necessary equipment and supplies, the student will determine the physical characteristics of that specimen and record. Findings must agree with those of the instructor.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

h. Concentration of a solution
i. Specific gravity
j. Osmolabity
k. Refractive index
l. Specific gravity
    1. Normal values
    2. Causes of abnormalities
m. Appearance of a dilute vs concentrated urine
n. Solids normally found in urine
o. Procedure for measuring specific gravity with urinometer vs refractometer

TASK

UP-4 Performing routine chemical analysis of urine by dipstick

PERFORMANCE OBJECTIVE

Perform and interpret dipstick analysis of urine.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Dipsticks
   1. Description
   2. Procedures for handling
   3. Q.C.

b. Chemicals measured with a dipstick
   1. Definition
   2. Clinical significance
   3. Normal values
   4. Causes of abnormal findings
   5. Principle of reactions
   6. Color changes
   7. Specificity
   8. Sensitivity
   9. Sources of error

(Continued on back)

Demonstration of Task:

By instructor

Laboratory Practice

Have learner practice performing and reading dipsticks.

INSTRUCTIONAL MATERIALS

Textbooks:

a. The Ames Company, Urodynamics

b. Davidsohn and Henry, Clinical Diagnosis by Laboratory Methods

Equipment and Supplies:

a. Urine

b. Dipsticks

c. Urotrol

LAB HOURS 4

CLASS HOURS 10

EVALUATION (UP-4)

a. Given a patient's urine and necessary supplies, the student will properly perform and record a dipstick analysis of urine. Findings must agree with those of the instructor.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

    10. Alternate methods for determining each
c. Definitions
    1. Proteninuria
    2. Glycosuria
    3. Hemoglobinuria
    4. Hematuria
    5. Tamm-Horsfall protein
    6. Bence-Jones protein
d. Proteins found in urine
e. Ketones found in urine
f. Quantitation of chemicals
g. Watson-Swartz test

TASK

UP-5 Performing protein tests by turbidimetric methods

PERFORMANCE OBJECTIVE

Perform turbidimetric protein analysis.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Limitations of dipstick method
b. Orthostatic proteinuria
c. Functional proteinuria
d. Normal values of urine protein
e. Procedure and principle of turbidimetric methods
f. Sensitivity
g. Specificity
h. Sources of error

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice performing the suffosalicylic turbidimetric method for urine protein.

INSTRUCTIONAL MATERIALS

Textbooks:

a. The Ames Company, Urodynamics
b. Davidsohn and Henry, Clinical Diagnosis by Laboratory Methods

Equipment and Supplies:

a. Urine
b. Suffosalicylic acid
c. Spectrophotometer
d. Standards
e. Centrifuge
f. Test tubes
g. Pipettes
h. Filter paper
i. Reagents

LAB HOURS 2
CLASS HOURS 1

EVALUATION (UP-5)

a. Given a fresh urine specimen and the necessary equipment and supplies, the student will perform a protein test by turbidimetric method. The presence or absence of protein must be determined as compared to standards of known values.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

TASK

UP-6 Performing clinitests

PERFORMANCE OBJECTIVE

Perform and interpret clinitests.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Benedicts reaction
b. Principle and procedure of clinitest
c. Sensitivity
d. Specificity
e. Sources of error
f. Compare clinitest to dipstick method and Benedicts

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice performing clinitests.

INSTRUCTIONAL MATERIALS

Textbooks:

a. The Ames Company, Urodynamics
b. Davidsohn and Henry, Clinical Diagnosis by Laboratory Methods

Equipment and Supplies:

a. Urine
b. Clinitest-special tubes
c. Reagents

LAB HOURS 2
CLASS HOURS 1

EVALUATION (UP-6)

a. Given a patient's urine and the necessary equipment and supplies, the student will perform a clinitest. Findings must agree with the instructor.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

TASK

UP-7 Performing microscopic examinations of urinary sediment

PERFORMANCE OBJECTIVE

Prepare and perform urine microscopes.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

- a. Specimen of choice for microscopes
- b. Procedure for preparing a urine sediment for microscopic examination
- c. Sternheimer stain
- d. Identification of cells found in urine and their significance
  - 1. Erythorcytes
  - 2. Leukocytes
  - 3. Squamous
  - 4. Renal
  - 5. Transitional epithebial sperm
- e. Addis count
- f. Formation of casts

(Continued on back)

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner properly prepare and examine urine sediments.

INSTRUCTIONAL MATERIALS

Textbooks:

- a. The Ames Company, Urodynamics
- b. Davidsohn and Henry, Clinical Diagnosis by Laboratory Methods

Equipment and Supplies:

- a. Urine
- b. Centrifuge
- c. Slides
- d. Coverslips
- e. Microscope
- f. Sedi-stain
- g. Centrifuge tubes

LAB HOURS 10

CLASS HOURS 6

EVALUATION (UP-7)

a. Given fresh urine specimens, the student will perform microscopic examinations of the urinary sediments and record results. The identification and count of the formed elements must agree with the criteria established by the instructor.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

g. Identification and significance of parasites, fungi and bacteria found in urine
h. Identification and significance of casts found in urine
i. Identification and significance of crystals found in urine
j. Classification of crystals as present in acid or alkaline urine

TASK

IHP-1 Recognizing the importance of the immune process

PERFORMANCE OBJECTIVE

Demonstrate a basic understanding of the immune process.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Natural and acquired immunity
b. Defining
  1. Health
  2. Infectous disease
  3. Host-parasite relationship
c. Host protective mechanism
d. Antigen characteristics
e. Antibody characteristics and structure
f. Classes and characteristics of immune globuline
g. Humoral and cellular immunity
h. Autoimmune disease
i. Anamestic response
j. Antigen-antibody reactions
k. The complement system: characteristics, functions and complement fixation

INSTRUCTIONAL MATERIALS

Textbooks:

a. Bryant, An Introduction to Immunohematology and Laboratory Immunology and Serology
b. Barrett, Basic Immunology and its Medical Applications

LAB HOURS	
CLASS HOURS	10

EVALUATION (IHP-1)

Given the necessary information and related instruction, the student will demonstrate a basic understanding of the immune process. Evaluation will be by written examination and based on criteria specified by the instructor.

TASK

IHP-2 Recognizing the basic theory of genetics

PERFORMANCE OBJECTIVE

Describe the basic theory of genetics as its relates to blood banking.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Mitosis
b. Meiosis
c. Chromosomes
d. Genes
e. Locus
f. Allele
g. Homozygous
h. Heterozygous
i. Dominant
j. Recessive
k. Co-dominant
l. Phenotype
m. Genotype
n. Somatic cells
o. Gametes
p. Sex chromosomes
q. Genetic code
r. DNA
s. Determination of probable percentages of phenotypes and genotypes when given parental genotypes for blood group systems

INSTRUCTIONAL MATERIALS

Textbooks:

a. Bryant, An Introduction to Immunohematology and Laboratory Immunology and Serology
b. Medical dictionary

LAB HOURS	
CLASS HOURS	7

EVALUATION (IHP-2)

Given the necessary information and related instruction, the student will describe the basic theory of genetics as it relates to blood banking. Evaluation will be by written examination and based on criteria specified by the instructor.

TASK

IHP-3 Screening donors for phlebotomy

PERFORMANCE OBJECTIVE

Accept or reject prospective blood donors based on responses to the screening questions.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Questions that protect donor
b. Questions that protect recipient
c. Physical requirements
    1. Weight
    2. Temperature
    3. Pulse
    4. Blood pressure
    5. Hematocrit
d. Causes of rejection or deferment
e. Transmitted diseases
f. HBsAg
g. Autologous transfusions
h. Phresis
i. Time between donations

Demonstration of Task:

Touring local donor center

Laboratory Practice:

Have learner practice collecting the necessary information using a classmate as the potential donor. Furnish learner with completed record sheets of potential donors and have learner accept or reject based on information provided on record sheets.

INSTRUCTIONAL MATERIALS

Textbooks:

a. AABB, Technical Manual
b. Bryant, An Introduction to Immunohematology and Laboratory Immunology and Serology

LAB HOURS	3
CLASS HOURS	2

EVALUATION (IHP-3)

a. Given a donor and the necessary equipment and supplies, the student will screen the donor for phlebotomy. Donor acceptability or rejection will be dependent on the receipt of acceptable responses to the screening questions. Findings must conform to those of the instructor.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

TASK

IHP-4 Performing first aid for donor reactions

PERFORMANCE OBJECTIVE

Give first aid to blood donor experiencing adverse reaction.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

Types of donor reactions and how to treat them

1. Nausea
2. Nervous hyperventilation
3. Syncope
4. Convulsions
5. Shock
6. Hematoma

Demonstration of Task:

By instructor or advanced student

Laboratory Practice:

Have learner practice giving first aid to another student acting as a donor experiencing an adverse reaction.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Bryant, Laboratory Immunology and Serology and An Introduction to Immunohematolcgy
b. AABB, Technical Manual

LAB HOURS	
CLASS HOURS	2

EVALUATION (IHP-4)

a. Given a donor, who is experiencing adverse reactions to phlebotomy and first aid equipment, the student will perform first aid for reaction. Emergency management steps taken must agree with the prescribed symptoms and result in patient recovery.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

TASK

IHP-5 Drawing blood from donors

PERFORMANCE OBJECTIVE

Draw blood from donor.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Aseptic methods
b. Closed systems
c. Procedure
d. Refrigerator temperature
e. Care of donor after phlebotomy
f. Handling of unit
g. Blood units
    1. Amount
    2. Anticoagulants
    3. Storage requirements
    4. Storage changes
h. Processing requirements
i. Information on label
j. Transmittable disease

Demonstration of Task:

By instructor or qualified technician

Laboratory Practice:

This procedure should be performed in a clinical setting with strict supervision.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Bryant, An Introduction to Immunohematology and Laboratory Immunology and Serology
b. AABB, Technical Manual

LAB HOURS	
CLASS HOURS	2

EVALUATION (IHP-5)

a. Given a donor and the necessary equipment and supplies, the student will draw a pint of blood from a donor. Blood collection shall be by aseptic methods, utilizing a sterile, close system and a single venipuncture, with no damage to any tissue.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

TASK

IHP-6 Preparing special blood components

PERFORMANCE OBJECTIVE

Prepare blood components.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Criteria for selecting the type of blood component needed for a recipient
b. Methods of separation
c. Blood component justification
d. Massive transfusions
e. Definition, methods of collection or preparation, storage and/or indications for use of
    1. Whole blood
    2. Packed cells
    3. Buffy-coat poor, washed RBC
    4. Platelet
    5. Plasma fractions

(Continued on back)

Demonstration of Task:

By instructor

INSTRUCTIONAL MATERIALS

Textbooks:

a. AABB, Technical Manual
b. Bryant, An Introduction to Immunohematology and Laboratory Immunology and Serology

Equipment and Supplies:

a. Outdated units of blood
b. Plasma expressor
c. Rotator

LAB HOURS	2
CLASS HOURS	3

EVALUATION (IHP-6)

a. Given a unit of blood and necessary equipment and supplies, the student will prepare requested blood components. The final product must agree with the criteria established by the instructor.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

6. Cryoprecipitate
7. Fresh blood
8. Fresh frozen plasma
9. Frozen rbc

TASK

IHP-7 Organizing and storing blood

PERFORMANCE OBJECTIVE

Organize and store blood in a blood storage refrigerator.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Need for organization
b. Maintaining adequate stock
c. Procedure for organizing blood in refrigerator
d. Cleaning refrigerator
e. Temperature requirements
f. Temperature monitoring

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice cleaning refrigerator and organizing stock.

INSTRUCTIONAL MATERIALS

Textbooks:

AABB, Technical Manual

Equipment and Supplies:

a. Refrigerator
b. Blood stock

LAB HOURS	2
CLASS HOURS	1

EVALUATION (IHP-7)

Given several units of blood and the necessary equipment, the student will organize and store blood in a blood storage refrigerator. The refrigerator must be clean and adequately lighted to facilitate the inspection of the blood. Blood must be labeled according to blood groups and types in chronological order of collection.

TASK

IHP-8 Preparing blood for shipment

PERFORMANCE OBJECTIVE

Prepare blood for shipment.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Procedure for packing blood for shipment
b. Proper labelling
c. Shipping procedure

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice preparing blood for shipment.

INSTRUCTIONAL MATERIALS

Textbooks:

AABB, Technical Manual

LAB HOURS	1
CLASS HOURS	1

EVALUATION (IHP-8)

Given a unit of blood and the necessary equipment and supplies, the student will prepare the blood for shipment. The temperature of the blood in the container must be maintained at less than 10°C. The container must be firmly sealed and clearly identified.

TASK

IHP-9 Preparing and reporting agglutination reactions for blood bank procedures.

PERFORMANCE OBJECTIVE

Prepare, read and report agglutination reactions.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Proper specimens
b. Suitability of unclotted specimens
c. Washing red cells
d. Preparing cell suspension
    1. Estimated
    2. Measured
e. Agglutination reaction grading
f. Tube agglutination
g. Slide agglutination
h. Rouleaux and causes
    1. How to eliminate
    2. Significance
i. Significance of hemolysis

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner
a. Practice the preparation of rbc suspensions
b. Practice tube and slide agglutination reactions

INSTRUCTIONAL MATERIALS

Textbooks:

a. AABB, Technical Manual
b. Bryant, An Introduction to Immunohematology and Laboratory Immunology and Serology

Equipment and Supplies:

a. Clotted blood
b. 0.85% NaCl
c. Test tubes
d. Serofuge
e. Reading light

LAB HOURS 4
CLASS HOURS 1

EVALUATION (IHP-9)

a. Given blood and the necessary equipment and supplies, the student will prepare and report agglutination reactions. The degree of agglutination reactions must be consistent with prescribed grading and must agree with instructor's findings.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

TASK

IHP-10 Performing ABO grouping

PERFORMANCE OBJECTIVE

Perform an ABO grouping.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Natural and immune antibody characteristics
b. Zeta potential
c. ABO blood group history
d. Antigens and antibodies in 4 blood group systems
e. Procedure for tube and slide tests
f. Theory and procedure for forward testing
g. Theory and procedure for reverse testing
h. Causes for discrepancies in forward and reverse grouping
i. Forward and reverse results for 4 blood groups

(Continued on back)

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice slide and tube ABO testing.

INSTRUCTIONAL MATERIALS

Textbooks:

a. AABB, Technical Manual
b. Bryant, An Introduction to Immunohematology and Laboratory Immunology and Serology

Equipment and Supplies:

a. 0.85% NaCl
b. Clotted blood
c. Antisera
d. Cells
e. Serofuge
f. Reading light
g. Test tubes

LAB HOURS	5
CLASS HOURS	5

EVALUATION (IHP-10)

a. Given a blood specimen and the necessary equipment and supplies, the student will perform an ABO group test using test tube method. Blood specimen must be typed according to agglutination patterns as established by the presence or absence of agglutination on the red cells or agglutinogens in serum. Findings must concur with those of instructor.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

j. Percent occurance of 4 blood groups
k. Formation and occurance of ABO antigens and antibodies
l. ABO antibody characteristics
m. ABO antibody class of immunoglobulin
n. Secretors vs non-secretors
o. Subgroups of A
p. The H gene
q. Characteristics of "Bombay" type
r. Definition of natural isoagglutinin

TASK

IHP-11 Performing Rh testing

PERFORMANCE OBJECTIVE

Preform an Rh test.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Rh blood type history
b. Percent occurance of Rh positive and negative blood
c. Rh antibody
    1. Differences from ABO antibodies
    2. Characteristics
    3. Class of immunoglobulin
    4. Methods of occurance
d. Other antibodies in the Rh system
e. Theories of genetic control
    1. Weiner
    2. Fisher-Race

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice tube and slide Rh tests.

(Continued on back)

INSTRUCTIONAL MATERIALS

Textbooks:

a. AABB, Technical Manual
b. Bryant, An Introduction to Immunohematology and Laboratory Immunology and Serology

Equipment and Supplies:

a. Clotted blood
b. 0.85% NaCl
c. Test tubes
d. Serofuge
e. Reading light
f. Antisera
g. View box
h. Slides
i. 37°C heat block
j. Coombs reagent
k. 22% albumin

LAB HOURS 5

CLASS HOURS 5

EVALUATION (IHP-11)

a. Given a blood specimen and the necessary equipment and supplies, the student will test blood for Rh factors. Findings must agree with those of the instructor's.

b. Written examination: Evaluation will be based or criteria specified by the instructor.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

f. Phenotypes and genotypes
g. Variants of D
h. D control
i. Procedure slide and tube for D

TASK

IHP-12 Performing direct and indirect Coombs test (Antiglobulin Test)

PERFORMANCE OBJECTIVE

Perform a direct and an indirect Coombs test.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Defining
    1. Sensitized
    2. Auto antibody
    3. "In vivo"
    4. "In vitro"
b. Coombs reagent
    1. Broad spectrum
    2. Monospecific
c. Direct
    1. Procedure
    2. Clinical significance
d. Indirect
    1. Procedure
    2. Importance of washing
    3. Clinical significance
e. Check cells
f. False positives

(Continued on back)

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice direct and indirect procedure.

INSTRUCTIONAL MATERIALS

Textbooks:

a. AABB, Technical Manual
b. Bryant, An Introduction to Immunohematology and Laboratory Immunology and Serology

Equipment and Supplies:

a. Clotted blood
b. Coombs reagent
c. Test tubes
d. Serofuge
e. Reading light
f. 37°C heat block
g. Check cells
h. Microscope
i. 22% albumin
j. Antihuman globulin serum
k. Saline

LAB HOURS	2
CLASS HOURS	3

EVALUATION (IHP-12)

a. Given a specimen and the necessary equipment and supplies, the student will perform both a direct and indirect Coombs test on a blood sample. Result must be expressed as positive or negative agglutination and concur with instructor's findings.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

g. False negatives
h. Proteolytic engymes

TASK

IHP-13 Performing antibody screening tests

PERFORMANCE OBJECTIVE

Perform and interpret antibody screening tests.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Major antigens found, reaction characteristics of antibodies and clinical significance of the following blood groups
  1. Lewis
  2. Lutheran
  3. P
  4. MNS
  5. I
  6. Kell
  7. Kidd
  8. Duffy
  9. Xg^a

b. Antibody screening procedure

c. Interpretation of results

(Continued on back)

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice antibody screening tests and identify type of follow-up tests required on postive screens.

INSTRUCTIONAL MATERIALS

Textbooks:

a. AABB, Technical Manual

b. Bryant, An Introduction to Immunohematology and Laboratory Immunology and Serology

Equipment and Supplies:

a. Screening cells

b. Clotted blood

c. Albumin

d. Coombs reagent

e. Test tubes

f. Serofuge

g. Reading light

h. 37°C heat block

LAB HOURS	2
CLASS HOURS	3

EVALUATION (IHP-13)

a. Given recipient serum and the necessary equipment and supplies, the student will perform an antibody detection test to determine the presence of unexpected antibodies. Results must agree with instructor's findings.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

d. Discuss WBC and platelet
e. Antibodies
f. Define autoimmune
g. Follow up tests for positive screens

TASK

IHP-14 Performing antibody identifications

PERFORMANCE OBJECTIVE

Perform and interpret antibody identifications.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Criteria for performing panel
b. Selection of warm vs cold panel
c. Panel procedure
d. Panel interpretation
e. Reasons for unconclusive results
    1. Absorption
    2. Dilution

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice the identification of rbc antibodies in groups.

INSTRUCTIONAL MATERIALS

Textbooks:

a. AABB, Technical Manual
b. Bryant, An Introduction to Immunohematology and Laboratory Immunology and Serology

Equipment and Supplies:

a. Antibody panel
b. 0.85% NaCl
c. Albumin
d. Test tubes
e. Serofuge
f. Reading light
g. Clotted blood
h. Coombs reagent
i. 37°C heat block

LAB HOURS	4
CLASS HOURS	1

EVALUATION (IHP-14)

a. Given a patient's serum which has been found positive for irregular antibodies and the necessary equipment and supplies, the student will identify the antibody. Results must agree with the instructor.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

TASK

IHP-15 Performing antibody titers (dilution)

PERFORMANCE OBJECTIVE

Perform antibody titers.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. When a titration should be done
b. Titration procedure
c. Serial dilutions
d. Titer considered "low" isoagglutinin

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice antibody titrations in groups.

INSTRUCTIONAL MATERIALS

Textbooks:

AABB, *Technical Manual*

Equipment and Supplies:

a. 0.85% NaCl
b. Clotted blood
c. Test tubes
d. A and B cells
e. 37°C heat block
f. Reading light
g. Serofuge
h. Serological pippettes

LAB HOURS	3
CLASS HOURS	1

EVALUATION (IHP-15)

a. Given a serum sample, blood specimen and the necessary equipment and supplies, the student will perform an antibody titer (dilution). Meticulous pipetting technique will be followed and all results read macroscopically. The presence of agglutination must be observed. The end point of the titration must be expressed as the highest dilution showing agglutinations.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

TASK

IHP-16 Crossmatching blood - compatibility testing

PERFORMANCE OBJECTIVE

Perform and interpret compatibility tests.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Purpose of a x-match
b. Limitations of a x-match
c. Differentiate between major and minor
    1. Components of each
    2. Incompatibilities in each
    3. Purpose of each
d. Phases of x-match
e. Saline vs High protein
f. Low ionic strength
g. Resolving the incompatible x-match
h. X-match procedure-false positives and negatives
i. X-match controls
j. Emergency x-match

(Continued on back)

Demonstration of Task:

By instructor

Laboratory Practice:

Practice x-matches.

INSTRUCTIONAL MATERIALS

Textbooks:

a. AABB, Technical Manual
b. Bryant, An Introduction to Immunohematology and Laboratory Immunology and Serology

Equipment and Supplies:

a. Clotted blood
b. Reagents
c. Test tubes
d. Reading light
e. Serofuge
f. 37°C heat block

LAB HOURS	4
CLASS HOURS	2

EVALUATION (IHP-16)

a. Given recipient and donor specimens and the necessary supplies and equipment, the student will perform a crossmatch of blood to determine compatibility. Blood is considered compatible and acceptable if no hemolysis or agglutination is seen in any phase. Results must agree with instructor's findings.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

k. Infusion of incompatible blood
l. Transfusion of non-group specific blood
m. Exchange transfusions

TASK

IHP-17 Performing Rh immune globulin crossmatch

PERFORMANCE OBJECTIVE

Perform and interpret Rh immune globulin crossmatch.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Etiology of HDN
b. Most common antibodies involved
c. Differentiate between IgG and IgM as related to HDN
d. Detection and confirmation of HDN
e. Antibody titers during pregnancy
f. Amniocentesis
g. Intra-uterine transfusions
h. Exchange transfusions
i. Prevention of Rh immunization
j. Rh immune globulin reagent
k. Procedure
l. Time interval for giving

(Continued on back)

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice performing the Rh immune crossmatch.

INSTRUCTIONAL MATERIALS

Textbooks:

a. AABB, Technical Manual
b. Bryant, An Introduction to Immunohematology and Laboratory Immunology and Serology

Equipment and Supplies:

a. Clotted blood
b. Rh immune globulin
c. Serofuge
d. 37°C heat block
e. Test tubes
f. Reagents
g. Droppers

LAB HOURS 1

CLASS HOURS 2

EVALUATION (IHP-17)

a. Given blood specimens and the necessary equipment and supplies, the student will perform an Rh immune globulin crossmatch. The results should be recorded compatible or incompatible based upon observed agglutination or hemolysis. Findings must agree with those of the instructor.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

m. Criteria for giving or not giving
n. Difficulties in Rh and ABO typing of an infant with HDN
o. Criteria for exchange transfusion

TASK

IHP-18 Investigating transfusion reactions

PERFORMANCE OBJECTIVE

Perform and interpret transfusion reaction investigations.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Causes of transfusion reactions
b. Delayed effects of transfusion
c. Records of transfusion complications
d. Specimens needed to investigate reactions
e. Procedure of transfusion reaction investigation

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice transfusion reaction investigations.

INSTRUCTIONAL MATERIALS

Textbooks:

a. AABB, Technical Manual
b. Bryant, An Introduction to Immunohematology and Laboratory Immunology and Serology

Equipment and Supplies:

a. Reagents
b. Specimen
c. 37°C heat block
d. Test tubes
e. Serofuge

LAB HOURS	1
CLASS HOURS	1

EVALUATION (IHP-18)

a. Given specimens and the necessary, equipment and supplies, the student will perform a transfusion reaction investigation. The results must agree with the findings of the instructor.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

TASK

IHP-19 Performing quality control procedures

PERFORMANCE OBJECTIVE

Perform quality control procedures.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Washing
b. Reading
c. Recording
d. Procedural controls
   1. ABO grouping
   2. Reverse grouping
   3. Rh typing
   4. Compatibility testing
   5. Antibody testing
   6. Direct and indirect Coombs
e. Reagent controls
   1. Antihuman serum control
   2. Reagent red cell control
   3. Antiserum control

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice performing specified quality control procedures.

(Continued on back)

INSTRUCTIONAL MATERIALS

Textbooks:

a. AABB, Technical Manual
b. Bryant, An Introduction to Immunohematology and Laboratory Immunology and Serology

Equipment and Supplies:

a. Reagents
b. Clotted blood
c. 37°C heat block
d. Reading light
e. Tachometer

LAB HOURS	3
CLASS HOURS	1

EVALUATION (IHP-19)

a. Given specimens and the necessary equipment and supplies, the student will perform and record a daily quality control program in the blood bank. Procedure and results must agree with the instructors.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

f. Serum to cell ratio
g. Cell suspension strength
h. Incubation temperature and time
i. Centrifugation time and speed

TASK

IHP-20 Performing screening tests for syphilis

PERFORMANCE OBJECTIVE

Perform and interpret non-specific tests for syphilis.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

- a. Syphilis
  - 1. Significance
  - 2. Causative agent
  - 3. Antibodies produced
  - 4. Disease process and treatment
  - 5. Diagnosis
  - 6. Closely related diseases
- b. Define serology and serological methods of diagnosis
- c. Darkfield examination
- d. Treponemal and non-treponemal
  - 1. Antigen

(Continued on back)

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice performing RPR's.

INSTRUCTIONAL MATERIALS

Textbooks:

- a. Bryant, *An Introduction to Immunohematology* and *Laboratory Immunology and Serology*
- b. Bennett, *Clinical Serology*

Equipment and Supplies:

- a. Rotator
- b. RPR kit
- c. Serum

LAB HOURS	4
CLASS HOURS	6

EVALUATION (IHP-20)

a. Given a patient's serum or plasma and the necessary equipment and supplies, the student will perform a Rapid Plasma Reagin (RPR) test. Results must be reported with one hundred percent accuracy with readings and results verified by instructor.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

  2. Type of antibody identified

e. False positives and negatives
f. History of flocculation tests for syphilis
g. Comparing RPR to VDRL
  1. Procedure
  2. Antigen
  3. Sensitivity
  4. Specificity
j. Procedure to follow if non-specific test is positive
k. Principles of FTA and TPI tests

TASK

IHP-21 Performing febrile agglutination series

PERFORMANCE OBJECTIVE

Perform febrile agglutination tests.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Direct and indirect methods of demonstrating bacterial infection
b. Factors that effect bacterial agglutination tests
    1. History of previous infection
    2. Vaccination
    3. Endemic area
    4. Cross reactivity
    5. Defective immune mechanism
c. K, O and H antigens and the type agglutination they produce
d. Widal reaction

(Continued on back)

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice performing febrile agglutination tests.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Bryant, An Introduction to Immunohematology and Laboratory Immunology and Serology
b. Bennett, Clinical Serology

Equipment and Supplies:

a. Febrile antigens
b. Serum
c. Ruled glass plates
d. Controls
e. Test kit
f. 0.2 ml serological pipettes
g. Light source
h. Wooden applicator stocks

LAB HOURS	1
CLASS HOURS	1

EVALUATION (IHP-21)

a. Given patient's serum and the necessary equipment and supplies, the student will perform febrile agglutination series. Determinations of control values must be with one hundred percent accuracy.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

e. Weil-Felix reaction
f. Febrile procedure

TASK

IHP-22 Performing rheumatoid arthritis test (RA)

PERFORMANCE OBJECTIVE

Perform slide tests for rheumatoid arthritis.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. The rheumatoid factor
b. Defining
    1. Rheumatoid arthritis
    2. Arthritis
    3. Rheumatism
    4. Rheumatic fever
c. Disease process of RA
    1. Clinical manifestation
    2. Treatment
d. Methods of diagnosis
e. Slide agglutination procedure and principle
f. False positives and negatives

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice performing slide RA agglutination tests.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Bennett, Clinical Serology
b. Bryant, An Introduction to Immunohematology and Laboratory Immunology and Serology

Equipment and Supplies:

a. RA kit
b. Serum

LAB HOURS	½
CLASS HOURS	½

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EVALUATION (IHP-22)

a. Given patient's serum and the necessary equipment and supplies, the student will perform Rheumatoid Arthritis test (RA). Results must be reported as positive or negative as indicated by comparison reactions in the RA positive and negative control sera.

b. Written examination: Evaluation will based on criteria specified by the instructor.

TASK

IHP-23 Performing antistreptolysin "O" tests and titers

PERFORMANCE OBJECTIVE

Perform and interpret ASO tests and titers.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Defining
    1. Group A beta hemolytic Streptococcus
    2. Streptolysin O
    3. Antistreptolysin O

b. Principle of ASO test and titer

c. Factors that effect the titer

d. Units for reporting results

e. Endpoint of the titer reaction

f. Normal ASO titer

g. Controls for titer

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice performing ASO screening tests, selecting the test results that indicate the need for a titer and the performance of ASO titers.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Bennett, *Clinical Serology*

b. Bryant, *An Introduction to Immunohematology* and *Laboratory Immunology and Serology*

Equipment and Supplies:

a. Serum

b. 0.85% NaCl

c. ASO kit

d. Test tubes

e. 37°C heat bath

f. Centrifuge

g. Rack

h. Pipettes

i. Graduated centrifuge tube

LAB HOURS 1

CLASS HOURS 1

EVALUATION (IHP-23)

a. Given patient's serum and the necessary equipment and supplies, the student will perform an ASO titer. Control values must fall within established manufacturer's range and be verified by instructor.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

TASK

IHP-24 Performing C-reactive protein (CRP) tests

PERFORMANCE OBJECTIVE

Perform and interpret CRP tests.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Defining
   1. CRP
   2. Acute phase reactant
b. Identifying conditions in which CRP is significant
c. Why CRP is a better indicator inflammatory disease than other acute phase reactants
d. Identifying other acute phase reactants
e. Normal valves of CRP
f. CRP procedure and principle
g. Factors that effect results

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice performing CRP's.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Bennett, Clinical Serology
b. Bryant, An Introduction to Immunohematology and Laboratory Immunology and Serology

Equipment and Supplies:

a. CRP test kit
b. Serum
c. 56°C heat bath

LAB HOURS	½
CLASS HOURS	½

EVALUATION (IHP-24)

a. Given patient's serum and the necessary equipment and supplies, the student will perform C-reactive protein test. Readings will be determined by protein presence and concentration and must be verified by the instructor.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

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TASK

IHP-25 Performing slide agglutination test for mononucleosis

PERFORMANCE OBJECTIVE

Perform and interpret slide tests for mononucleosis.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Defining
    1. Heterophile antigens and antibodies
    2. Forssman antigens and antibodies
b. Differentiating between reaction characteristics of
    1. Native Forssman antibodies
    2. Serum sickness
    3. Infectious mononucleosis
c. Principles of presumptive and differential tests
d. Infectious mononucleosis
    1. Disease process

(Continued on back)

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice monospot tests.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Bennett, Clinical Serology
b. Bryant, An Introduction to Immunohematology and Laboratory Immunology and Serology

Equipment and Supplies:

a. Monospot kit (or comparable)
b. Serum

LAB HOURS 1

CLASS HOURS 1

EVALUATION (IHP-25)

a. Given prepared slide of patient's serum or plasma and the necessary equipment and supplies, the student will perform slide agglutination test for mononucleosis. Test results will be reported by the presence or absence of agglutination as positive or negative and verified by the instructor.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

    2. Clinical manifestations
    3. Methods of diagnosis

e. Principle of "spot" tests

TASK

IHP-26 Performing slide and tube pregnancy tests

PERFORMANCE OBJECTIVE

Perform and interpret slide and tube pregnancy tests.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. History of pregnancy tests
b. Chorionic gonadotropin
c. Principle of pregnancy tests
d. Difference in tube and slide tests
    1. Sensitivity
    2. Cost
e. Proper collection of urine
f. Serum tests
g. Limitations of procedure
h. Interfering substances

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice slide and tube pregnancy tests.

INSTRUCTIONAL MATERIALS

Textbooks:

Bryant, *An Introduction to Immunohematology* and *Laboratory Immunology and Serology*

Equipment and Supplies:

a. Pregnancy test kit
b. Urine
c. Heat block

LAB HOURS ½
CLASS HOURS ½

EVALUATION (IHP-26)

a. Given a patient's urine and the necessary supplies and equipment, the student will perform a pregnancy test. Results should be positive or negative and agree with the results obtained by the instructor.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

TASK

IHP-27 Performing cold agglutinin test

PERFORMANCE OBJECTIVE

Perform and interpret cold agglutinin tests.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Properties of cold agglutinins
b. Serological characteristics of cold agglutinins
c. Occurance in normal sera
d. Mycoplasma pneumonial as related to cold agglutinins
e. Specimen handling
f. Disease processes related to cold agglutinins
g. Procedure and principle
h. Streptococcus MG and primary a typical pneumonia

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice performing tests for cold agglutinins.

INSTRUCTIONAL MATERIALS

Textbooks:

Bryant, *An Introduction to Immunohematology* and *Laboratory Immunology and Serology*

Equipment and Supplies:

a. Serum
b. "O" cells
c. 37°C heat bath
d. Refrigerator
e. 12x100 mm test tubes
f. Serological pipettes
g. 5°C refrigerator
h. 0.85% Saline
i. Centrifuge
j. Centrifuge tube
k. Therometer

LAB HOURS	1
CLASS HOURS	1

EVALUATION (IHP-27)

a. Given patient's serum and the necessary equipment and supplies, the student will perform cold agglutinin test. Agglutination interpretation must agree with findings of the instructor.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

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TASK

HP-1 Recognizing proper anticoagulants

PERFORMANCE OBJECTIVE

Demonstrate the ability to select proper anticoagulants.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Difference in plasma and serum
b. Defining anticoagulant
c. Differentiating between the following as to definition, chemical constituent, ratio of anticoagulant to blood, advantages and disadvantages and method of anticoagulation and uses
    1. EDTA
    2. Heparin
    3. Oxalate
    4. Citrate
    5. NaF
d. Tube top colors

INSTRUCTIONAL MATERIALS

Textbooks:

Hyun, Ashton and Dolan, Practical Hematology

Equipment and Supplies:

Vacutainers with a variety of tube top colors

LAB HOURS	
CLASS HOURS	3

EVALUATION (HP-1)

Given the necessary information and related instruction, the student will demonstrate the ability to select proper anticoagulants. Evaluation will be by written examination and based on criteria specified by the instructor.

TASK

HP-2 Preparing and staining blood smears

PERFORMANCE OBJECTIVE

Prepare and stain blood smears.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Specimen collection
b. Smear procedure
c. Preparing bone marrow slides
d. Advantages and disadvantages of coverslip preparation
e. Romanowsky stains and modifications
   1. Dyes
   2. Buffer ph
   3. Purpose of methyl alcohol
   4. Time and sequence
   5. Diluent
   6. Sources of error
f. Automated stainers

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner prepare five acceptable blood smears and practice staining slides until results are acceptable.

INSTRUCTIONAL MATERIALS

Textbooks:

Hyun, Ashton and Dolan, Practical Hematology

Equipment and Supplies:

a. Gloss slides
b. Wrights stain
c. Buffer
d. Staining rack
e. Drying rack
f. Microscope

LAB HOURS 3

CLASS HOURS 2

EVALUATION (HP-2)

Given fresh EDTA specimen and the necessary equipment and supplies, the student will prepare and stain blood smear. The blood smears must be uniform and gradually tapered to a smooth, feathered edge. The stained smear must clearly indicate color for analysis with no precipitated stain.

TASK

HP-3 Performing cell counts

PERFORMANCE OBJECTIVE

Perform and interpret cell counts.

INSTRUCTIONAL ACTIVITIES

Prerequisite Task:

1.00 Orientation to Medical Laboratory Technology

Provide Information On:

a. Cellular elements found in blood
b. Steps in any manual counting procedure
c. Dimensions of Neubaur ruling
d. Count calculation with Neubaur ruling
e. Method of counting on a hemocytometer
f. Procedure for cell counts
g. Dilutions in unopettes

(Continued on back)

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice performing cell counts on the Neubaur ruling and calculate and interpret the results.

INSTRUCTIONAL MATERIALS

Textbooks:

Hyun, Ashton and Dolan, Practical Hematology

Equipment and Supplies:

a. Blood dilution pipettes
b. Diluents
c. Hemocytometer
d. Blood
e. Microscope
f. Unopettes

LAB HOURS	1
CLASS HOURS	2

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EVALUATION (HP-3)

a. Given specimen and necessary equipment and supplies, the student will perform the designated cell count and select the proper diluent and dilution. The procedure should be acceptable for the type of count selected and the results should agree with the findings of the instructor.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

h. Diluting fluids
    1. RBC
    2. WBC
    3. Platelets
    4. CSF
    5. Sperm
i. Normal values
    1. RBC
    2. WBC
    3. Platelets
    4. Discuss increases and decreases in each
j. Sources of error in counts
k. Correcting WBC counts for nucleated red cells
l. Principle of Coulter counter
m. Dimensions and use of Fusch-Rosenthal counting chamber
n. Procedures for CSF and sperm counts
o. Normal values for CSF and sperm counts
p. Addis count

TASK

HP-4 Performing hemoglobin tests (Cyanmethemoglobin Method)

PERFORMANCE OBJECTIVE

Perform and interpret hemoglobin tests.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Hemoglobin
    1. Chemical structure
    2. Function
    3. Origin
    4. Types
    5. Four major methods of determination
    6. Normal values
b. Principle and procedure of Cyanmethemoglobin
    1. Types of hgb measure
    2. Chemical components
    3. Dilution
c. Factors effecting hgb levels
d. Structure of adult and fetal hemoglobin

(Continued on back)

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice performing hgb curve and determinations.

INSTRUCTIONAL MATERIALS

Textbooks:

Hyun, Ashton and Dolan, Practical Hematology

Equipment and Supplies:

a. Drabkins
b. Sahli pipettes
c. Spectrophotometer
d. Reagents
e. Calibration curve

LAB HOURS	1
CLASS HOURS	3

EVALUATION (HP-4)

a. Given a blood sample and the necessary equipment and supplies, the student will perform a hemoglobin test, using the cyanmethemoglobin method. Results must be recorded without error and findings must agree with control value and instructor's findings within 0.5 gram/100 ml.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

e. Methods of differentiation
f. Characteristics of hgb F
g. Principle of Kleihaus and Singer tests for hgb F
h. Conditions when adults have hgb F
i. Electrophoretic patterns and procedure
j. Fingerprinting
k. Define hemoglobinopathy

TASK

HP-5 Performing hematocrit tests

PERFORMANCE OBJECTIVE

Perform and interpret hematocrit tests.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Defining
    1. Hematocrit
    2. PCV
    3. VPRC
b. Methods of determing hct
c. Normal values
d. Sources of error in procedure (include obtaining sample errors)
e. Suitable anticoagulants
f. Correlating hct and hdg values
g. Diseases associated with increased or decreased values

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice microhematocrit procedure and relate it to the hemoglobin.

INSTRUCTIONAL MATERIALS

Textbooks:

Hyun, Ashton and Dolan, *Practical Hematology*

Equipment and Supplies:

a. Capillary tubes
b. Sealer
c. Specimen
d. Centrifuge
e. Hematocrit reader

LAB HOURS 1

CLASS HOURS 1

EVALUATION (HP-5)

a. Given a specimen and the necessary equipment and supplies, the student will perform a hematocrit test. Duplicates must be within +.5% and within 1% of instructor's findings.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

TASK

HP-6 Calculating erythrocyte indices

PERFORMANCE OBJECTIVE

Calculate red cell indices and relate them to other related findings.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Definitions, formulas and normal values
    1. MCV
    2. MCH
    3. MCHC
b. Correlation with morophology
c. Findings with various types of animias
d. Purpose of indices
e. Defining
    1. Hypochromic
    2. Normochromic
    3. Hyperchromic
    4. Anisochromia
    5. Aniscytosis
    6. Microcytic

(Continued on back)

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice indices, calculations and relate them to RBC morphology.

INSTRUCTIONAL MATERIALS

Textbooks:

Hyun, Ashton and Solan, Practical Hematology

LAB HOURS	
CLASS HOURS	3

EVALUATION (HP-6)

a. Given the red blood cell count (RBC), hemoglobin (HGB) and hematocrit (Hct) readings, the student will calculate the MCV, MCHC and the MCH of a patient's blood sample. The results of the calculation must be recorded without error and must agree with instructor's findings.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

7. Macrocytic
8. Normocytic
9. Poikilocytosis
10. Spherocytic

TASK

HP-7 Performing erythrocyte sedimentation rates (ESR)

PERFORMANCE OBJECTIVE

Perform and interpret ESR's.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Defining
   1. ESR
   2. Acute phase reactant
b. Methods of determining ESR
c. Sources of error
d. Disease states related to ESR
e. Normal values
f. Relating to other acute phase reactants
g. Correction for anemia

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice performing ESR's.

INSTRUCTIONAL MATERIALS

Textbooks:

Hyun, Ashton and Dolan, *Practical Hematology*

Equipment and Supplies:

a. Wintrobe tubes
b. Tube rack
c. Blood
d. Timer
e. Anemia correction chart

LAB HOURS	1
CLASS HOURS	1

EVALUATION (HP-7)

a. Given a patient specimen and the necessary equipment and supplies, the student will perform an erythrocyte sedimentation rate. Results must be recorded without error and agree with instructor's findings.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

TASK

HP-8 Performing erythrocyte osmotic fragility tests

PERFORMANCE OBJECTIVE

Perform and interpret osmotic fragility tests.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Purpose of osmotic fragility test
b. Factors affecting test
c. Conditions that increase or decrease results
d. Principle and procedure
e. Endpoint
f. Effects of hypertonic or hypotonic media to RBC
g. Normal values
h. Serial dilutions

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice performing osmotic fragility test.

INSTRUCTIONAL MATERIALS

Textbooks:

Hyun, Ashton and Dolan, Practical Hematology

Equipment and Supplies:

a. NaCl
b. Blood
c. Diluent
d. Test tubes
e. Syringes
f. Needles

LAB HOURS 1

CLASS HOURS 1

EVALUATION (HP-8)

a. Given a patient or a blood specimen and the necessary equipment and supplies, the student will perform an erythrocyte fragility test. The degree of hemolysis must be recorded and fall within ± 1 tube of initial and complete hemolysis. All findings must agree with those of the instructor.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

TASK

HP-9 Performing reticulocyte counts

PERFORMANCE OBJECTIVE

Perform and interpret reticulocyte counts and relate them to other findings.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Defining
   1. Reticulocyte
   2. Diffusely basophilic erythrocyte
   3. Stipple cell
b. How the above are related
c. Clinical information gained
d. Procedure and principle of retic count
e. Defining vital stain
f. Stains used for retic count
g. Normal values - adults and newborn
h. Relate count to RBC morphology

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice reticulocyte counts and compare findings with laboratory partner.

INSTRUCTIONAL MATERIALS

Textbooks:

Hyun, Ashton and Dolan, Practical Hematology

Equipment and Supplies:

a. New methylene blue
b. Blood
c. Capillary tubes
d. Microscope

LAB HOURS	2
CLASS HOURS	1

EVALUATION (HP-9)

a. Given specimens and the necessary equipment and supplies, the student will perform a reticulocyte count in duplicate. Results and duplicate must be within 10 reticulocytes /1000 RBC's and must agree within 10% of the instructor's findings.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

TASK

HP-10 Recognizing normal characteristics of erythrocytes

PERFORMANCE OBJECTIVE

Identify cells of the erythrocytic series.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Hematopoietic organs
b. Maturation process of erythrocytis
    1. Morphological criteria
    2. Sequence
    3. Other nomenclatures
c. Central pallor
d. Content and function of RBC
e. Variations in size and shape
f. Variations in structure H. J. bodies, etc.
g. Clinical manifestation of above variations
h. Normal peripheral findings

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice identification of normal RBC in all stages of maturation and commonly encountered variations.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Hyun, Ashton and Dolan *Practical Hematology*
b. Diggs, *Morphology of Human Blood Cells*

A/Vs:

ASCP, "Granulocytic Identification," slide/tape

Equipment and Supplies:

a. Stained smears
b. Microscope

LAB HOURS 3
CLASS HOURS 3

EVALUATION (HP-10)

a. Given a stained smear, the student will identify normal erythrocytes in all stages of maturation and commonly occuring variations. Findings and identification must agree with the instructor.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

TASK

HP-11 Recognizing normal characteristics of leukocytes

PERFORMANCE OBJECTIVE

Identify cells of the leukocytic series.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Granulocytes - Nongranulocytes
b. Granulocytic maturation and differentiation
c. Maturation of lymphocytes and monocytes
d. T cells and B cells
e. Origin of WBC
f. Function of WBC
g. Normal values on peripheral smar
h. Atypical lymphs
i. Absolute vs. relative value
j. Diseases associated with abnormal findings
k. Morphological criteria for identification of

(Continued on back)

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice identifying WBC's.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Hyun, Ashton and Dolan, Practical Hematology

A/Vs:

ASCP, "Granulocytic Identification," slide/tape

Equipment and Supplies:

a. Smears - stained
b. Microscope

LAB HOURS	4
CLASS HOURS	4

EVALUATION (HP-11)

a. Given a stained blood smear, the student will identify the leukocytes present. Findings and identifications must agree with the instructor's.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

1. Granulocytes
2. Lymphocytes
3. Monocytes

TASK

HP-12 Performing platelet counts and slide evaluations

PERFORMANCE OBJECTIVE

Perform a platelet count and evaluate slides.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Maturation process
b. Function
c. Methods for platelet counts
    1. Slide evaluation
    2. Phase
    3. Rees-Ecker
    4. Automated
d. Defining
    1. Thrombocyte
    2. Thrombocytopenia
    3. Thrombocytosis
    4. Thrombocythemia
    5. Thrombasthemia

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice platelet counts and slide evaluations.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Hyun, Ashton and Dolan, Practical Hematology
b. Diggs, Morphology of Human Blood Cells

Equipment and Supplies:

a. Hemocytometer
b. Rees-Ecker diluting fluid
c. Microscope
d. Stained smears

LAB HOURS	2
CLASS HOURS	2

EVALUATION (HP-12)

a. Given a blood sample, the student will evaluate the platelets by a platelet count and correlation of that count to the slide evaluation. Your conclusions must agree with the instructor.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

TASK

HP-13 Performing differential cell counts

PERFORMANCE OBJECTIVE

Perform a differential cell count.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Examining smear on low power
   1. WBC distribution
   2. Quality of stain
   3. Rouleaux
b. Examining smear on high power
   1. Estimating WBC count and correlating with Coulter count
   2. Selecting counting area
c. Examining an oil-immersion
   1. Differentiation of WBC
   2. RBC morphology
   3. Platelet estimate and morphology
d. Normal values

(Continued on back)

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice normal differentials.

INSTRUCTIONAL MATERIALS

Textbooks:

Hyun, Ashton and Dolan, Practical Hematology

Equipment and Supplies:

a. Smears stained
b. Microscope
c. Cell counters
d. Immersion oil

LAB HOURS 8

CLASS HOURS 2

EVALUATION (HP-13)

a. Given the necessary equipment and supplies, the student will perform a differential cell count on a blood slide. The cell count must fall within ±2 SD, as determined by the instructor's findings.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

e. Sources of error
f. Correlation with indices
g. Correction for nucleated reds
h. Diseases related to abnormal differentials

TASK

HP-14 Recognizing characteristics of leukocyte disorders

PERFORMANCE OBJECTIVE

Identify the existence of leukocyte disorders.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Hypersegmented polys
b. Hyposegmented polys
c. Aver rods
d. Toxic granules
e. Dohle (Amato) bodies
f. Drumstick
g. Leukomoid reactions
h. Mononucleosis
i. Pelger - Huet
j. Chediak - Higashi
k. May - Hegglin
l. Alder - Reilly
m. Three categories of malignant disorders of RE system
    1. Acute leukemia

(Continued on back)

Laboratory Practice:

Have learner observe slides and photographs on the above disorders and be able to recognize the need for further evaluation.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Hyun, Ashton and Dolan, Practical Hematology
b. Diggs, Morphology of Human Blood Cells

LAB HOURS	4
CLASS HOURS	5

EVALUATION (HP-14)

Given the necessary information and related instruction, the student will identify the existence of leukocyte disorders. Evaluation will be by written examination and based on criteria specified by the instructor.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

    2. Subacute leukemia
    3. Chronic leukemia
n. Blood picture and related findings of following
    1. Undifferentiated blast-cell leukemia
    2. AGL
    3. ALL
    4. AML-Schilling and Naegeli types
    5. CGL
    6. CLL
    7. DiGuglielmo's leukemia
    8. Plasma cell leukemia
    9. Hairy cell leukemia
    10. Hodgkins
    11. Multiple mycloma
    12. Waldenstrom
o. Myelofibrosis
p. Defining
    1. Myelofibrosis
    2. Lymphoma
    3. Sarcoma
q. Pertinent findings in
    1. Burketts tumor
    2. Sezary's syndrome
    3. Malignant hestiocytosis
r. Ph chromosome

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TASK

HP-15 Recognizing erythrocyte disorders

PERFORMANCE OBJECTIVE

Identify the existence of erythrocyte disorders.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Defining anemia
b. Classification of anemias
c. Nutritional factors necessary for erythocyte formation
d. Chronic and acute blood loss
e. Blood picture and related findings of following
    1. P.A.
    2. Iron deficiency anemia
    3. Thallasemia
    4. Aplastic anemia
    5. Polycythemias
    6. PNHm PCH
    7. Sickle cell (anemia and trait)

Laboratory Practice:

Have learner observe slides and photographs of the above disorders and be able to recognize the need for further evaluation.

(Continued on back)

INSTRUCTIONAL MATERIALS

Textbooks:

Hyun, Ashton and Dolan, Practical Hematology

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LAB HOURS	2
CLASS HOURS	4

EVALUATION (HP-15)

Given the necessary information and related instruction, the student will identify the existence of erythrocyte disorders. Evaluation will be by written examination and based on criteria specified by the instructor.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

8. G-6-PD deficiency
f. Hemolytic anemias
g. Malaria findings

TASK

HP-16 Performing sickle cell tests

PERFORMANCE OBJECTIVE

Perform and interpret sickle cell tests.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Hemoglobinopathies
b. Thallasemias
c. Methods of detection of abnormal hgb
d. Differences in sickle cell trait and anemia
e. Methods of demonstrating sickle cell
f. Clinical manifestations of sickle cell
g. Hgb C disease and trait
h. Hgb S-C disease

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice performing sickledex and identifying the morphology of sickle cells on blood smears.

INSTRUCTIONAL MATERIALS

Textbooks:

Hyun, Ashton and Dolan, Practical Hematology

Equipment and Supplies:

a. Sickledex (or comparable commercial product)
b. Blood

LAB HOURS	1
CLASS HOURS	2

EVALUATION (HP-16)

a. Given a patient sample and Sickledex (or comparable commercial product), the student will perform a sickle cell test and identify the findings as indicating presence or absence of sickle cells. Findings must agree with those of the instructor.

b. Written examimation: Evaluation will be based on criteria specified by the instructor.

TASK

HP-17 Performing lupus erythematosus (LE) tests

PERFORMANCE OBJECTIVE

Perform and interpret LE tests.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Definition of L.E.
b. Origin and activity of L.E. factor
c. Characteristics of L.E. cell
d. Methods of L.E. preps
    1. Zimmer and Hargraves
    2. Magath and Winkle
    3. Zinkman and Conley
    4. Defibrination and rotation
e. Rosettes
f. Tart cells
g. ANA

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice performing and interpreting L.E. tests.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Hyun, Ashton and Dolan, Practical Hematology
b. Diggs, Morphology of Human Blood Cells

Equipment and Supplies:

a. L.E. preps
b. Microscope
c. Centrifuge
d. Hematocrit tubes
e. Strainer
f. Pestle
g. Petri dish
h. Reagents

LAB HOURS 1

CLASS HOURS 1

EVALUATION (HP-17)

a. Given a patient or a specimen and the necessary equipment and supplies, the student will perform a lupus erythematosus test. The inclusion body must be observed as smooth, homogeneous and smoky in appearance. All findings of L.E. cells must agree with instructor's.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

TASK

HP-18 Performing peroxidase stains

PERFORMANCE OBJECTIVE

Perform and interpret peroxidase stains.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Principle and procedure
b. Interpretation of results

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice performing and interpreting peroxidase stains.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Hyun, Ashton and Dolan, Practical Hematology
b. Diggs, Morphology of Human Blood Cells

Equipment and Supplies:

a. Blood
b. Reagents
c. Microscope
d. Stainer

LAB HOURS	1/2
CLASS HOURS	1/2

EVALUATION (HP-18)

a. Given a blood sample and the necessary equipment and supplies, the student will perform a peroxidase staining procedure. Stain must be rated acceptable by instructor.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

TASK

HP-19 Performing leukocyte alkaline phosphatase (LAP) stains

PERFORMANCE OBJECTIVE

Perform and interpret LAP stains.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Leukomoid reaction
b. Principle and procedure
c. Selection of blood for positive control
d. Normal score
e. Indications of increased activity
f. Indications of decreased activity

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice staining LAP smears and interpreting the stains.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Hyun, Ashton and Dolan, *Practical Hematology*
b. Diggs, *Morphology of Human Blood Cells*

Equipment and Supplies:

a. Stains
b. Blood
c. Microscope
d. Slides
e. Reagents

LAB HOURS 1/2
CLASS HOURS 1/2

EVALUATION (HP-19)

a. Given a patient specimen and the necessary equipment and supplies, the student will perform a LAP stain. Smears should be examined microscopically by instructor to ascertain that cells are well stained. The strong positive control must rate strong positive and the normal control rate normal when examined by instructor. The stain must be rated acceptable on examination by the instructor.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

TASK

HP-20 Recognizing fundamentals of coagulation

PERFORMANCE OBJECTIVE

List and/or identify the basic fundamentals of coagulation.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Coagulation factors
   1. Names
   2. Numbers
   3. Origin
   4. Related diseases
b. Coagulation scheme
   1. Three phases
   2. Intrinsic
   3. Extrinsic
c. Role of Ca^{++}, FSF, platelets
d. D.I.C.
e. Vitamin K dependent factors
f. Anti-vitamin K drugs
g. Anticoagulants used in therapy

INSTRUCTIONAL MATERIALS

Textbooks:

Davidsohn and Henry, Clinical Diagnosis by Laboratory Methods

LAB HOURS	
CLASS HOURS	5

EVALUATION (HP-20)

Given the necessary information and related instruction, the student will list and/or identify the basic fundamentals of coagulation. Evaluation will be by written examination and based on criteria specified by the instructor.

TASK

HP-21 Performing prothrombin time tests (protimes)

PERFORMANCE OBJECTIVE

Perform and interpret protimes.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Extrinic pathway
b. Relationship to oral anticoagulants
c. Reagents used and proper handling
d. Procedure and principle
e. Normal value
f. Factors measured
g. Indication of abnormal results
h. Specimen collection and handling
i. Relationship to PTT
j. Using a fibrometer

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice performing protimes by hand and fibrometer.

INSTRUCTIONAL MATERIALS

Textbooks:

Davidsohn and Henry, Clinical Diagnosis by Laboratory Methods

Equipment and Supplies:

a. Fibrometer
b. Water bath
c. Thromboplastic
d. Controls

LAB HOURS	1
CLASS HOURS	1

EVALUATION (HP-21)

a. Given a venous blood specimen and the necessary equipment and supplies, the student will perform a prothrombin time test. The clotting time in seconds must agree with ±2 seconds or normal control value. Duplicate value must agree with ±½ second.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

TASK

HP-22 Performing partial thromboplastin time (PTT) tests (activated)

PERFORMANCE OBJECTIVE

Perform and interpret PTT tests.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Intrinsic pathway
b. Factors measured
c. Relationship to platelet activity
d. Normal value
e. Procedure and principle
f. Indications of abnormal results
g. Specimen collection and handling
h. Reagent handling
i. Relationship to patient
j. Significance of "activated"

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice performing and interpreting PTT tests.

INSTRUCTIONAL MATERIALS

Textbooks:

Davidsohn and Henry, Clinical Diagnosis by Laboratory Methods

Equipment and Supplies:

a. Fibrometer
b. Activated thromboplastin
c. $CaCl_2$
d. Blood
e. Controls

LAB HOURS	1
CLASS HOURS	1

EVALUATION (HP-22)

a. Given a venous blood specimen and the necessary equipment and supplies, the student will perform an APTT test. The test must be run in duplicate and recordings must agree within ±1.5 seconds. Findings must agree with instructor's results.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

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TASK

HP-23 Determining clotting times

PERFORMANCE OBJECTIVE

Perform and interpret clotting times.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Lee-White
  1. Procedure
  2. Normals
  3. Factors measured
  4. Sources of error
  5. Significance
b. Method of collection
c. Capillary method
  1. Procedure
  2. Normals
  3. Significance
  4. Sources of error

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice performing clotting times by Lee-White and capillary methods.

INSTRUCTIONAL MATERIALS

Textbooks:

Davidsohn and Henry, Clinical Diagnosis by Laboratory Methods

Equipment and Supplies:

a. Stopwatch
b. Glass syringe
c. Tubes 13 x 100mm
d. 37^oC heat bath
e. Capillary tubes
f. 20-gauge needles
g. Test tubes

LAB HOURS	1
CLASS HOURS	1

EVALUATION (HP-23)

a. Given a patient and the necessary equipment and supplies, the student will determine the coagulation time by Lee-White method. Venipuncture should be done with a single direct thrust and blood must contain air bubbles. Recorded results of the coagulation time must be acceptable to the instructor.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

TASK

HP-24 Performing bleeding times

PERFORMANCE OBJECTIVE

Perform and interpret bleeding times.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Duke method
    1. Procedure
    2. Normal values
    3. Significance
    4. Sources of error
b. Ivy method
    1. Procedure
    2. Normal values
    3. Significance
    4. Sources of error

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice performing the Ivy bleeding time.

INSTRUCTIONAL MATERIALS

Textbooks:

Davidsohn and Henry, Clinical Diagnosis by Laboratory Methods

Equipment and Supplies:

a. Lancet
b. Stopwatch
c. Filter paper
d. Pressure cuff

LAB HOURS	1
CLASS HOURS	1

EVALUATION (HP-24)

a. Given a patient and the necessary equipment and supplies, the student will perform an Ivy bleeding time. The puncture must be placed properly and be the correct depth. Results must agree with the instructor's findings.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

TASK

HP-25 Recognizing principles of miscellaneous coagulation procedures

PERFORMANCE OBJECTIVE

Demonstrate a basic knowledge of the principles of commonly encountered coagulation tests.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Principles of
    1. Tourniquet test
    2. Clot retraction
    3. FSP
    4. FDP
    5. Thrombin time
    6. TGT
b. Russel's viper venom
c. Fibrinolysis

INSTRUCTIONAL MATERIALS

Textbooks:

Davidsohn and Henry, Clinical Diagnosis by Laboratory Methods

LAB HOURS	
CLASS HOURS	2

EVALUATION (HP-25)

Given the necessary information and related instruction, the student will demonstrate a basic knowledge of the principles of commonly encountered coagulation tests. Evaluation will be by written examination and based on criteria specified by the instructor.

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TASK

CCI-1 Recognizing safety measures necessary to the clinical chemistry laboratory

PERFORMANCE OBJECTIVE

Demonstrate safety measures necessary to the chemistry laboratory.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Safety hazards
b. Safety measures
c. First aid
d. Hepatitis

Demonstration of Task:

By instructor

Laboratory Practice:

The learner should practice safety measures at all times.

INSTRUCTIONAL MATERIALS

Textbooks:

ASCP, Laboratory Medicine, Vol. II, No. 9

A/Vs:

NIH, "Nobody's Perfect," movie film

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LAB HOURS	
CLASS HOURS	4

EVALUATION (CCI-1)

Evaluation will be by observation of the student in the laboratory through the course. Safety measures must be practiced at all times.

TASK

CCI-2 Performing quality control

PERFORMANCE OBJECTIVE

Perform and record quality control data.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Standards
b. Controls
c. Quality control
d. Standard deviation
e. Coefficient of variation
f. Shewhart charts
g. Gaussian distribution curve
h. Mean
i. Median
j. Mode
k. Validity
l. Accuracy
m. Precision
n. Trend
o. Shift
p. Normal values

Demonstration of Task:

By instructor

Laboratory Practice:

a. Set up all the procedures used in the chemistry course by accepted quality control standards.
b. Record readings on wall charts for each procedure.
c. Complete practice exercises to be turned in.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Davidsohn and Henry, *Clinical Diagnosis by Laboratory Methods*
b. *Tietz, Fundamentals of Clinical Chemistry*

LAB HOURS
CLASS HOURS 10

EVALUATION (CCI-2)

a. Given the necessary information, related instruction and supplies, the student will perform quality control procedures and record quality control data. The procedures must be performed according to established quality control standards and the data must be accurately recorded.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

TASK

CCI-3 Performing laboratory mathematics

PERFORMANCE OBJECTIVE

Perform mathematical calculations for commonly used laboratory procedures.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Percent solutions and calculations
b. Normality solutions and calculations
c. Molarity solutions and calculations
d. Concentration and dilution calculations
e. Conversion calculations
f. Serial dilutions

Demonstration of Task:

By instructor

Laboratory Practice:

Provide practice sheets to perform calculations and have groups of learners calculate and prepare a variety of solutions.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Davidsohn and Henry, *Clinical Diagnosis by Laboratory Methods*
b. Tietz, *Fundamentals of Clinical Chemistry*

Equipment and Supplies:

a. Chemicals
b. Balances
c. Distilled HOH
d. Glassware

LAB HOURS ☐

CLASS HOURS 10

EVALUATION (CCI-3)

Given the necessary information and related instruction, the student will demonstrate the ability to perform mathematical calculations for commonly used laboratory procedures. Evaluation will be by written examination and based on criteria specified by the instructor.

TASK

CCI-4 Recognizing types of instrumentation

PERFORMANCE OBJECTIVE

Demonstrate a basic knowledge of commonly used types of instrumentation.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Spectrophotometry
b. Flame photometry
c. Atomic absorption
d. Electrophoresis
e. Automated analyzers
f. Fluorometry
g. RIA
h. Electrochemistry

Demonstration of Task:

By instructor or qualified technician

INSTRUCTIONAL MATERIALS

Textbooks:

Lee, Elementary Principles of Laboratory Instruments

A/Vs:

ASMT Education and Research Fund, Inc., "Basic Concepts in Laboratory Instrumentation," slide/tape

Equipment and Supplies:

Commonly used laboratory instruments

LAB HOURS ☐

CLASS HOURS 6

EVALUATION (CCI-4)

Given the necessary information and related instruction, the student will demonstrate a basic knowledge of commonly used types of instrumentation. Evaluation will be by written examination and based on criteria specified by the instructor.

TASK

CCI-5 Performing tests using Beer's law

PERFORMANCE OBJECTIVE

Calculate and record data determined by spectrophotometric analysis.

INSTRUCTIONAL ACTIVITIES

Prerequisite Task:

0.10 Operating a spectrophotometer

Provide Information On:

a. Light
    1. Ultraviolet
    2. Visible
    3. Infrared
b. Wavelength
c. Units of measure of light
d. Percent transmission
e. Absorbance
f. Beer's law
g. Didynium filter calibration

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice calculating concentration of unknown solutions spectrophotometric techniques.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Davidsohn and Henry, Clinical Diagnosis by Laboratory Methods
b. Tietz, Fundamentals of Clinical Chemistry

Equipment and Supplies:

a. Spectrophotometer
b. Didynium filter
c. Colored solutions
d. Calibration charts

LAB HOURS	
CLASS HOURS	5

EVALUATION (CCI-5)

a. Given the necessary equipment, the student will calculate the concentration of unknown solutions using spectrophotometric technique and Beer's law. Answers must agree with those calculated by the instructor.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

TASK

CCI-6 Preparing calibration curves

PERFORMANCE OBJECTIVE

Prepare calibration curves.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Working standards
b. Stock standards
c. Calibration curves

Demonstration of Task:

By instructor

Laboratory Practice:

Provide groups of learners with a stock standard and have them practice preparing calibration curves.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Annino, Clinical Chemistry: Principles and Procedures
b. Davidsohn and Henry, Clinical Diagnosis by Laboratory Methods
c. Tietz, Fundamentals of Clinical Chemistry

Equipment and Supplies:

a. Stock standard
b. Diluent
c. Glassware
d. Spectrophotometer
e. Graph paper

LAB HOURS 4
CLASS HOURS 2

EVALUATION (CCI-6)

a. Given a stock standard of know concentration, the student will prepare a calibration curve. Controls read off the curve shall agree with those read on the instructor's calibration curve.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

TASK

CCI-7 Performing protein tests

PERFORMANCE OBJECTIVE

Perform tests for total proteins and albumins and calculate A/G ratios.

INSTRUCTIONAL ACTIVITIES

Prerequisite Task:

0.10 Operating a spectorphotometer

Provide Infromation On:

a. Protein free filtrates
b. Proteins
c. Electrophoresis
d. Biuret and protein methodology
e. Methods for albumin determination
f. A/G ratio
g. CSF and urine proteins
h. Disease states related to protein
i. Immunoelectrophoresis
j. Bence-Jones protein
k. Normal values - blood, urine and CSF

Demonstration of Task:

By instructor

Laboratory Practice:

a. Have groups of learners practice biuret procedure.
b. Provide exercises for learners to practice calculation of A/G ratio.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Davidsohn and Henry, Clinical Diagnosis by Laboratory Methods
b. Tietz, Fundamentals of Clinical Chemistry

Equipment and Supplies:

a. Biuret reagent
b. Specimen
c. Spectrophotometer
d. Glassware
e. Control

LAB HOURS 4
CLASS HOURS 4

EVALUATION (CCI-7)

a. Given a specimen and the necessary equipment and supplies, the student will perform total protein and albumin tests. From these results, the student will calculate the A/G ratio. Values must be within ±2 SD of the control.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

TASK

CCI-8 Performing blood urea nitrogen (BUN) tests

PERFORMANCE OBJECTIVE

Perform BUN tests.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. NPN
b. Nitrogen needs
c. BUN - metabolism
d. Ammonia
e. Factors effecting BUN
f. BUN methodology
g. Normal values
h. Disease states related to BUN

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner groups practice the diacetyl monoxime method for determining BUN.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Annino, Clinical Chemistry: Principles and Procedures
b. Davidsohn and Henry, Clinical Diagnosis by Laboratory Methods
c. Tietz, Fundamentals of Clinical Chemistry

Equipment and Supplies:

a. BUN kit
b. Specimens
c. Control
d. Spectrophotometer
e. Glassware
f. Reagents
g. Standard

LAB HOURS 2
CLASS HOURS 3

EVALUATION (CCI-8)

a. Given a specimen and the necessary equipment and supplies, the student will perform a blood urea nitrogen test. Values for the control specimen must fall within ±2 SD of the control value.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

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TASK

CCI-9 Performing creatinine tests

PERFORMANCE OBJECTIVE

Perform creatinine tests.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Creatinine and creatine metabolism
b. Factors effecting creatinine
c. Creatinine/BUN ratio
d. Urine creatinine
e. Creatinine clearance
f. Clearance tests
g. Creatinine methodology
h. Normal values
i. Disease states related to creatinine

Demonstration of Task:

By instructor

Laboratory Practice:

a. Have learner groups practice performing creatinine tests.
b. Provide practice exercises for learners to practice calculating clearance tests.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Annino, Clinical Chemistry: Principles and Procedures
b. Davidsohn and Henry, Clinical Diagnosis by Laboratory Methods
c. Tietz, Fundamentals of Clinical Chemistry

Equipment and Supplies:

a. Creatinine kit
b. Specimen
c. Control
d. Spectrophotometer
e. Glassware
f. Reagents

LAB HOURS 2

CLASS HOURS 2

EVALUATION (CCI-9)

a. Given a specimen and the necessary equipment and supplies, the student will perform creatinine tests and calculate a creatinine clearance from test results. Values must fall within ±2 SD of the control results.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

TASK

CCI-10 Performing uric acid tests

PERFORMANCE OBJECTIVE

Perform uric acid tests.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Uric acid metabolism
b. Factors effecting uric acid
c. Uric acid methodology
d. Normal values
e. Disease states related to uric acid

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner groups practice performing uric acid tests.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Annino, Clinical Chemistry: Principles and Procedures
b. Davidsohn and Henry, Clinical Diagnosis by Laboratory Methods
c. Tietz, Fundamentals of Clinical Chemistry

Equipment and Supplies:

a. Uric acid kit
b. Specimen
c. Control
d. Spectrophotometer
e. Glassware
f. Reagents

LAB HOURS	2
CLASS HOURS	2

EVALUATION (CCI-10)

a. Given a specimen and the necessary equipment and supplies, the student will perform uric acid tests. Values must fall within ±2 SD of the control value.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

TASK

CCI-11 Performing glucose tests

PERFORMANCE OBJECTIVE

Perform glucose tests.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Carbohydrate metabolism
b. Hormone effects
c. Carbohydrate load effect on urine
d. Disease states related to glucose
e. Glucose methodology
f. Normal values
    1. Blood
    2. Urine
    3. CSF
g. Relating serum and urine findings

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner groups practice performing glucose tests.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Annino, Clinical Chemistry: Principles and Procedures
b. Davidsohn and Henry, Clinical Diagnosis by Laboratory Methods
c. Tietz, Fundamentals of Clinical Chemistry

Equipment and Supplies:

a. Glucose reagent
b. Boiling water
c. Ice bath
d. Spectrophotometer
e. Glassware
f. Standard
g. Specimens
h. Control

LAB HOURS	3
CLASS HOURS	3

EVALUATION (CCI-11)

a. Given patient serum or plasma and the necessary equipment and supplies, the student will perform a glucose determination. Values must be within ±2 SD of control value.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

TASK

CCI-12 Performing glucose tolerance tests (GTT)

PERFORMANCE OBJECTIVE

Perform glucose tolerance tests.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Screening tests for diabetes
b. Hyperglycemia
c. Hypoglycemia
d. GTT procedure
e. Factors effecting GTT
f. Normal curves
g. Abnormal curves

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice performing glucose tolerance tests.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Annino, Clinical Chemistry: Principles and Procedures
b. Davidsohn and Henry, Clinical Diagnosis by Laboratory Methods.
c. Tietz, Fundamentals of Clinical Chemistry

Equipment and Supplies:

a. Glucose solution
b. Glucose reagents
c. Spectrophotometer
d. Boiling water
e. Ice bath
f. Standards
g. Specimens
h. Control

LAB HOURS 3

CLASS HOURS 3

EVALUATION (CCI-12)

a. Given specimens and the necessary equipment and supplies, the student will perform a glucose tolerance test. All specimens must be identified with patient's name, date and time with 100% accuracy. Glucose determination on urine and blood must fall within ±2 SD of control.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

TASK

CCI-13 Performing bilirubin tests - direct and indirect

PERFORMANCE OBJECTIVE

Perform direct and indirect bilirubin tests.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Hemoglobin degradation
b. Bilirubin metabolism
c. Differentiate characteristics of conjugated and unconjugated bilirubin
d. Bilirubin methodology
e. Normal values
f. Disease states related to bilirubin
g. Porphyrins
h. Urobilinogen

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner group practice performing bilirubin tests.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Annino, Clinical Chemistry: Principles and Procedures
b. Davidsohn and Henry, Clinical Diagnosis by Laboratory Methods
c. Tietz, Fundamentals of Clinical Chemistry

Equipment and Supplies:

a. Bilirubin kit
b. Specimen
c. Spectrophotometer
d. Glassware
e. Reagents
f. Standard
g. Control

LAB HOURS 4

CLASS HOURS 4

EVALUATION (CCI-13)

a. Given a specimen and the necessary equipment and supplies, the student will perform tests for bilirubin. The control must fall within ±2 SD of the expected results.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

TASK

CCI-14 Performing lipid tests

PERFORMANCE OBJECTIVE

Perform lipid tests.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Physical and chemical characteristics of lipids
b. Classes of lipids
c. Function of the liver in lipid metabolism
d. Lipoproteins
e. Fatty acids
    1. Triglycerides
    2. Cholesterol (free, total and asters)
f. Cholesterol methodology
g. Triclyceride methodology
h. Normal values
i. Disease states related to lipid metabolism

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner groups practice performing cholesterol tests.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Annino, Clinical Chemistry: Principles and Procedures
b. Davidsohn and Henry, Clinical Diagnosis by Laboratory Methods
c. Tietz, Fundamentals of Clinical Chemistry

Equipment and Supplies:

a. Cholesterol kit
b. Spectrophotometer
c. Glassware
d. Specimen
e. Control
f. Reagents
g. Standard

LAB HOURS 4

CLASS HOURS 4

EVALUATION (CCI-14)

a. Given a specimen and the necessary equipment and supplies, the student will perform a total cholesterol determination. Values must be within ±2 SD (total cholesterol).

b. Written examination: Evaluation will be based on criteria specified by the instructor.

TASK

CCI-15 Performing electrolyte tests

PERFORMANCE OBJECTIVE

Perform tests for electrolytes.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Body water
b. Anions and catons of the body
c. Units of measure of electrolytes
d. Normal values of electrolytes
e. Physiological control of electrolyte levels
f. Major role of electrolytes
g. Disease states related to electrolytes
h. Methodology for
    1. Na
    2. K
    3. CO_2
    4. Cl
    5. Ca
    6. P
    7. Mg
i. Urine electrolytes
j. Electrolyte balance

Demonstration of Task:

By instructor (Demonstrate flame determination and atomic absorption at working laboratory.)

Laboratory Practice:

Have learner groups practice performing:
a. Harleco CO_2 determination
b. Titration - Cl
c. Kit procedures for Mg, Ca
d. Phosphorus determination

INSTRUCTIONAL MATERIALS

Textbooks:

a. Annino, Clinical Chemistry: Principles and Procedures
b. Davidsohn and Henry, Clinical Diagnosis by Laboratory Methods
c. Tietz, Fundamentals of Clinical Chemistry

Equipment and Supplies:

a. Kits for each electrolyte test
b. Natelson
c. Reagents
d. Burette
e. Spectrophotometer
f. Specimens
g. Controls

LAB HOURS 8

CLASS HOURS 10

EVALUATION (CCI-15)

a. Given specimens and the necessary equipment and supplies, the student will perform the following tests: a) Ca, b) Mg, c) Cl, d) Co_2 and e) P. Control values must fall within ±2 SD of the expected value.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

TASK

CCI-16 Describing blood gas analysis

PERFORMANCE OBJECTIVE

Describe the procedures for blood gas analysis.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. pH
b. Buffer systems of the body
c. Henderson-Hasselbach equation
d. HCO_3/H_2CO_3 system
e. Parameters of blood gas analysis
f. Normal values of blood gas parameters
g. Acidosis
h. Alkalosis
i. Metabolic
j. Respiratory
k. Compensation correction
l. Methods of collecting blood gases

Demonstration of Task:

By instructor in a working laboratory

INSTRUCTIONAL MATERIALS

Textbooks:

a. Annino, Clinical Chemistry: Principles and Procedures
b. Davidsohn and Henry, Clinical Diagnosis by Laboratory Methods
c. Tietz, Fundamentals of Clinical Chemistry

LAB HOURS	
CLASS HOURS	10

EVALUATION (CCI-16)

Given the necessary information and related instruction, the student will describe the principles and procedures for blood gas analysis. Evaluation will be by written examination and based on criteria specified by the instructor.

TASK

CCI-17 Performing enzyme tests

PERFORMANCE OBJECTIVE

Perform enzyme tests.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Enzymes
b. Catalyst
c. Classification of biological enzymes
d. Basic enzyme reaction
e. Zero and first order of kinetics
f. Isoenzymes - methods and significance of LD, CK and alkaline phosphatase
g. Methodology, clinical significance and normal values for
    1. Amylase
    2. Lipase
    3. Acid phosphatase
    4. Alkaline phasphatase
    5. AST

(Continued on back)

Laboratory Practice:

Have learner groups practice performing kit procedures on selected enzymes.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Annino, Clinical Chemistry: Principles and Procedures
b. Davidsohn and Henry, Clinical Diagnosis by Laboratory Methods
c. Tietz, Fundamentals of Clinical Chemistry

Equipment and Supplies:

a. Kits for each enzyme test
b. Spectrophotometer
c. Glassware
d. Specimen
e. Control
f. Standard
g. Reagent

LAB HOURS 6

CLASS HOURS 12

EVALUATION (CCI-17)

a. Given specimens and the necessary equipment and supplies, the student will perform selected enzyme tests. The control must fall within ±2 SD of the expected value.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

6. ALT
7. CK
8. LD
9. G-6-PD

TASK

CCI-18 Describing endocrine tests

PERFORMANCE OBJECTIVE

Describe the principles and procedures for endocrine tests.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Endocrine glands
b. Hormones
c. Source and function of
    1. Adrenocortical hormones
    2. Steroids
    3. Androgens
    4. Estrogens
    5. Thyroid hormones
    6. Pituitary hormones
    7. Insulin

Demonstration of Task:

By laboratory technicians

INSTRUCTIONAL MATERIALS

Textbooks:

a. Davidsohn and Henry, Clinical Diagnosis by Laboratory Methods
b. Tietz, Fundamentals of Clinical Chemistry

LAB HOURS	
CLASS HOURS	5

EVALUATION (CCI-18)

Given the necessary information and related instruction, the student will describe the principles and procedures for endocrine tests. Evaluation will be by written examination and based on criteria specified by the instructor.

TASK

CCI-19 Describing toxicology tests

PERFORMANCE OBJECTIVE

Describe the principles and procedures for toxicology tests.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Blood alcohol
b. Salicylates
c. Drug screens

Demonstration of Task:

By laboratory technicians

INSTRUCTIONAL MATERIALS

Textbooks:

a. Davidsohn and Henry, Clinical Diagnosis by Laboratory Methods
b. Tietz, Fundamentals of Clinical Chemistry

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LAB HOURS	
CLASS HOURS	4

EVALUATION (CCI-19)

Given the necessary information and related instructions, the student will describe the principles and procedures for toxicology tests. Evaluation will be by written examination and based on criteria specified by the instructor.

TASK

CCI-20 Performing gastric analyses

PERFORMANCE OBJECTIVE

Analyze gastric contents.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Gastric contents
b. Diseases associated with gastric analysis
c. Methodology of gastric content analysis
d. Normal values

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner groups practice gastric analysis methods.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Davidsohn and Henry, Clinical Diagnosis by Laboratory Methods
b. Tietz, Fundamentals of Clinical Chemistry

Equipment and Supplies:

a. pH meter
b. Solutions
c. Burette
d. Evaporating dishes
e. Specimen
f. Standards

LAB HOURS	2
CLASS HOURS	1

EVALUATION (CCI-20)

a. Given a specimen and the necessary equipment and supplies, the student will perform a selected method of gastric content analysis. Values must be within ±5% of the instructor's value.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

TASK

MP-1 . Performing sterilization

PERFORMANCE OBJECTIVE

Sterilize using the autoclave.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Transmission of bacteria
b. Nosocomial infections
c. Infection control
d. Defining
    1. Sterilization
    2. Disinfection
    3. Antiseptic
e. Three methods of sterilization and their uses
f. Isolation techniques
g. Procedure for autoclaving
h. Methods of specimen processing that aid in infection control
i. Principle of kilit and/or spore strips

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner practice operating the autoclave and performing quality control.

INSTRUCTIONAL MATERIALS

Textbooks:

Koneman, Color Atlas and Textbook of Diagnostic Microbiology

Equipment and Supplies:

a. Autoclave
b. Kilits or spore strips

LAB HOURS	1
CLASS HOURS	2

EVALUATION (MP-1)

Given a specimen for sterilization, the student will sterilize the specimen in the autoclave. The specimen must be loaded properly and sterilized at 121°C, 15 psi for 15 minutes.

TASK

MP-2 Preparing basic media

PERFORMANCE OBJECTIVE

Provide resources needed for correct preparation of commonly used media.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Procedure for operating bunsen burner
b. Safety precautions
c. Procedure for preparing slants and plates
d. Q.C. for sterility

Demonstration of Task:

By instructor

Laboratory Practice:

Have students work in groups and prepare both a slant and a plate media from dry packets.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Bailey and Scott, Diagnostic Microbiology
b. Koneman, Color Atlas and Textbook of Diagnostic Microbiology

Equipment and Supplies:

a. Bunsen burners
b. Commercially available dry packets of media
c. Asbestos gloves
d. Autoclave
e. Test tubes
f. Cotton plugs
g. Flasks
h. Petri dishes

LAB HOURS	2
CLASS HOURS	1

EVALUATION (MP-2)

Given the necessary supplies and equipment, the student will prepare a slant of media and a plate of media. The prepared media must meet the following criteria.

Slant	Plate
1. Provides adequate slant and butt	1. Media the proper depth
2. Media free from bubbles	2. Media surface smooth and free from bubbles
3. Sterile	3. Minimum condensation on cover
	4. Sterile

TASK

MP-3 Performing proper specimen handling

PERFORMANCE OBJECTIVE

Handle specimens for maximum recovery of pathogens.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Transport media
b. Anaerobic handling
c. Immediate innoculation
d. Centrifuging specimens
e. Refrigerate of specimens
f. Proper labels
g. Proper handling techniques for
    1. CSF
    2. Urine
    3. Throat
    4. Vaginal
    5. Wound
    6. Sputum
    7. Blood
    8. Stool
h. Safety measures

Laboratory Practice:

Have learner practice handling different types of specimens.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Bailey and Scott, *Diagnostic Microbiology*
b. Koneman, *Color Atlas and Textbook of Diagnostic Microbiology*

LAB HOURS	1
CLASS HOURS	1

EVALUATION (MP-3)

a. Given different types of specimens, the student will demonstrate the proper handling techniques. Handling of specimens must conform to the written procedures of the laboratory.

b. Written examination: Evaluation will be based on criteria established by the instructor.

TASK

MP-4 Streaking plates

PERFORMANCE OBJECTIVE

Streak a specimen for isolation of colonies.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Importance of isolated colonies
b. Pure cultures
c. Safety
    1. Wash hands
    2. Specimen handling
    3. Bunsen burner
d. Procedure for streaking plates
e. Defining pure culture

Demonstration of Task:

By instructor

Laboratory Practice:

Have students streak plates, incubate and observe in 24 hours. Bring plates from hospital and identify isolated colonies.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Bailey and Scott, Diagnostic Microbiology
b. Koneman, Color Atlas and Textbook of Diagnostic Microbiology

Equipment and Supplies:

a. Incubator
b. Bunsen burner
c. Plate media
d. Specimen
e. Nichrome loop
f. Phenol
g. Slant media

LAB HOURS	1
CLASS HOURS	1

EVALUATION (MP-4)

Given the necessary supplies and equipment, the student will streak plate for isolation. Resultant streaking must be plated to facilitate the further isolation and identification of bacteria.

TASK

MP-5 . Performing initial plating of cultures on appropriate media

PERFORMANCE OBJECTIVE

Perform initial plating of cultures on appropriate media.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types and uses of media
b. Selection of media based on type of specimen
    1. Selective
    2. Enrichment
    3. Differential
    4. Basic nutrient
c. Proper selection of media for
    1. CSF
    2. Sputum
    3. Blood
    4. Stool
    5. Urine
    6. Throat
    7. Vaginal
    8. Wounds

Laboratory Practice:

Have learner perform several plating exercises using a variety of good specimens.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Bailey and Scott, Diagnostic Microbiology
b. Koneman, Color Atlas and Textbook of Diagnostic Microbiology

Equipment and Supplies:

a. Series of specimens
b. Culture tubes
c. Culture media
d. Petri-plates
e. Bunsen burner
f. Calibrated loop
g. Laboratory chemicals

LAB HOURS 1

CLASS HOURS 2

EVALUATION (MP-5)

Given the necessary supplies and equipment, the student will form initial plating of cultures on appropriate media. Specimens must be correctly identified, plating of culture must be appropriate to specimen and results must be in agreement with findings of instructor.

TASK

MP-6 Preparing and staining slides by Gram stain method

PERFORMANCE OBJECTIVE

Prepare and stain slides by Gram stain method.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Fundamentals of gram stain
b. Preparing slides
c. Staining slides
d. Basic anatomy and physiology of bacteria
    1. Morphological forms
    2. Nutritional requirements
    3. Specialized structures
    4. Reproduction

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner perform and read several gram stains.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Bailey and Scott, *Diagnostic Microbiology*
b. Koneman, *Color Atlas and Textbook of Diagnostic Microbiology*

Equipment and Supplies:

a. Gram staining solutions
b. Bunsen burner
c. Loops
d. Specimen
e. Microscope
f. Glass slides

LAB HOURS 2
CLASS HOURS 2

EVALUATION (MP-6)

a. Given the necessary supplies and equipment, the student will prepare and stain slides by Gram stain method. Results must be such that all gram positive organisms appear purple and all gram negative organisms appear pink.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

TASK

MP-7 Performing biochemical identification of pathogenic gram positive cocci

PERFORMANCE OBJECTIVE

Perform differential tests for the identification of pathogenic gram positive cocci.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Gram stain characteristics, growth requirements, clinical manifestations of pathogenic species of
  1. Staphylococus
  2. Streptococcus
  3. Peptococcus
b. Tests that differentiate S. aureus from S. epidermidis
c. Tests that differentiate staphylococcus from streptococcus
d. Three methods of classification of streptococcus
  1. Brown
  2. Lancefields
  3. Bergerp

(Continued on back)

Demonstration of Task:

By instructor

Laboratory Practice:

Have student perform the necessary tests to identify pathogenic gram positive cocci.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Bailey and Scott, Diagnostic Microbiology
b. Koneman, Color Atlas and Textbook of Diagnostic Microbiology

Equipment and Supplies:

a. H_2O_2
b. Rabbit plasma
c. Manitol salt agar
d. PSE plates
e. "A" disc
f. "P" disc
g. BAP
h. Hippurite broth
i. SF broth

(Continued on back)

LAB HOURS	4
CLASS HOURS	5

EVALUATION (MP-7)

a. Given an isolated colony of a known control organism from the genera Staphylococcus and Streptococcus, inoculating supplies and other necessary materials, the student will perform biochemical identification system on gram positive cocci employing necessary quality control. The readings both negative and positive must agree with those expected from previously tested control organisms.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

e. Three types of hemolysis on BAP
f. Principles, significance and procedures for
    1. Catalase test
    2. Coagulase test
    3. "A" disc
    4. "P" disc
    5. Camp test
    6. Esculine hydrolysis
    7. Bile solubility
    8. Hippurate hydrolysis
    9. Mannitol salt plates
    10. SF broth
g. Important toxins produced

INSTRUCTIONAL MATERIALS

Equipment and Supplies:

j. Bile solubility (plate or tube)
k. Inaculating wire
l. Bunsen burner

TASK

MP-8 Performing identification of gram positive rods

PERFORMANCE OBJECTIVE

Recognize criteria for follow-up tests necessary for identification of pathogenic gram positive rods.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

Basic characteristics on genus

1. *Bacillus* with emphasis on *anthracis*, *cereus*
2. *Corynebacterium* with emphasis on *diptheriae*
3. *Listeria* with emphasis on *monocytogenens* - motiliby test

Demonstration of Task:

By instructor

INSTRUCTIONAL MATERIALS

Textbooks:

a. Bailey and Scott, *Diagnostic Microbiology*
b. Koneman, *Color Atlas and Textbook of Diagnostic Microbiology*

LAB HOURS

CLASS HOURS 2

EVALUATION (MP-8)

Given a written test, the student will identify the criteria for follow-up tests necessary for the identification of pathogenic gram positive rods. Evaluation will be based on criteria established by the instructor.

TASK

MP-9 Performing biochemical identification system on gram negative cocci

PERFORMANCE OBJECTIVE

Perform differential tests for the identification of gram negative cocci.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Neisseriae
   1. Clinical significance
   2. Growth requirements
   3. Special media
   4. Gram stain characteristics
   5. Pathogenic species
   6. As normal flora
b. Veillonella
c. Biochemical tests for confirmation of genus-oxidase
d. Biochemical tests for species identification-CTA sugar
e. Quality control
f. Steps of procedure

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner perform necessary tests for identification of pathogenic gram negative cocci.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Bailey and Scott, Diagnostic Microbiology
b. Koneman, Color Atlas and Textbook of Diagnostic Microbiology

Equipment and Supplies:

a. Oxidase reagent
b. CTA sugars
c. T-M media
d. CO_2 incubator or candle jar
e. Chocolate plates
f. Inoculating wire
g. Bunsen burner
h. Filter paper

LAB HOURS	3
CLASS HOURS	2

EVALUATION (MP-9)

a. Given an isolated colony of a control organism from the family Neisseriaceae, innoculating supplies and other necessary materials, the student will perform biochemical system identification on gram negative cocci employing necessary quality control. The readings, both positive and negative, must agree with those from previously tested control organisms.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

TASK

MP-10 Performing biochemical identification system on a gram negative rod

PERFORMANCE OBJECTIVE

Perform biochemical tests for pathogenic gram negative rod identification.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Characteristics common to all members of Enterobacteriaciae
b. Principles and significance of ImVic reactions
c. Lactose fermenters and non-fermenters
d. TSI results
e. Clinical manifestations of pathogenic Enterobacteriaciae
f. Urease reaction and its significance
g. Colony characteristics of pathogenic enteries
h. Polyvalent Salmonella polysera

(Continued on back)

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner bring innoculated and incubated biochemical tests from hospital to perfect reading ability. Perform necessary tests for identification of pathogenic gram negative rods.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Bailey and Scott, Diagnostic Microbiology
b. Koneman, Color Atlas and Textbook of Diagnostic Microbiology

A/Vs:

Commercial companies will often present demonstrations and/or provide A/V aids.

Equipment and Supplies:

a. API strips
b. Enterotube
c. Oxi-ferm
d. Micro-ID
e. MacConkey or EMB plates
f. O-F media
g. Bunsen burner
h. Innoculating wire
i. Oxidase

LAB HOURS	6
CLASS HOURS	9

EVALUATION (MP-10)

a. Given an isolated colony of a control from the genus Enterobacteriaciae or Pseudomonas, innoculating supplies and other necessary materials, the student will perform biochemical system identification on gram negative rods employing necessary quality control. The readings, both positive and negative, must agree with those expected from the previously tested quality control organism.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

i. Types of media that suppress normal G.I. growth
j. Selective media used with enterics
k. Procedure for using API, Enterotube, Micro-ID
l. Sugar reactions of Pseudomonas
m. TSI reactions of Pseudomonas
n. Differential flagellar characteristics
o. Colony characteristics of pathogenic Pseudomonas
p. Oxidase reaction
q. Oxidation and fermentation
r. Principle, procedure and interpretation of O-F media
s. Procedure for using oxiferm

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TASK

MP-11 Performing identification of gram negative coccibacillus

PERFORMANCE OBJECTIVE

Recognize criteria for identification of gram negative coccibacillus.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

Basic characteristics and disease manifestations of
- a. Haemophilis with emphasis on
    - 1. Influenza
    - 2. Aegyptis
    - 3. Ducreyi
    - 4. X and V strip procedure
    - 5. Satellitism
- b. Francisella with emphasis on tularenis
- c. Bordetella with emphasis on pertussis
- d. Brucella with emphasis on
    - 1. Suis
    - 2. Abortus
    - 3. Melitensis

Demonstration of Task:

By instructor

INSTRUCTIONAL MATERIALS

Textbooks:

- a. Bailey and Scott, *Diagnostic Microbiology*
- b. Koneman, *Color Atlas and Textbook of Diagnostic Microbiology*

Equipment and Supplies:

- a. X and V strips
- b. BAP
- c. Stock Staphylococcus

LAB HOURS	
CLASS HOURS	3

EVALUATION (MP-11)

Given the necessary information and related instruction, the student will demonstrate a basic knowledge of the principles and procedures for performing identification of gram negative cocibacillus. Evaluation will be by written examination and based on criteria specified by the instructor.

TASK

MP-12. Performing antibiotic susceptibility test

PERFORMANCE OBJECTIVE

Perform Kirby-Baur susceptibility test.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Kirby-Bauer methodology
b. MIC
c. Steps of procedure

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner perform and read Kirby-Bauer susceptibility tests.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Bailey and Scott, *Diagnostic Microbiology*
b. Koneman, *Color Atlas and Textbook of Diagnostic Microbiology*

Equipment and Supplies:

a. Tryptose phosphage broth
b. $BaCl_2$ standard
c. Mueller-Hinton plates
d. Antibiotic discs
e. Bunsen burner
f. Tubes
g. Control cultures
h. Innoculating loop
i. Alcohol
j. Forceps
k. mm ruler
l. Incubator

LAB HOURS 2

CLASS HOURS 2

EVALUATION (MP-12)

a. Given the necessary equipment and supplies, the student will perform an antibiotic sensitivity test. The readings of the zone diameters for each disc must be within ranges specified for the previously tested quality control organisms must be recorded as resistant, intermediate or susceptible.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

TASK

MP-13 Processing T.B. specimens for inoculating

PERFORMANCE OBJECTIVE

Perform T.B. inoculations to yield growth of acid-fast organisms.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Mycobacterium
    1. General characteristics
    2. Disease manifestation
    3. Diagnostic methods
    4. Pathogenic species
b. Safety measures
c. Specimen handling
d. Acid-fast stains - procedure and principles
e. Runyon classification

Demonstration of Task:

By instructor or laboratory technician

Laboratory Practice:

It is suggested that students not handle T.B. in a student lab. Practical application under hospital or medical laboratory supervision.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Bailey and Scott, Diagnostic Microbiology
b. Koneman, Color Atlas and Textbook of Diagnostic Microbiology

Equipment and Supplies:

a. Acid-fast stains
b. Incubator
c. Tubes
d. Reagents
e. Culture media
f. Exhaust hood

LAB HOURS	
CLASS HOURS	2

EVALUATION (MP-13)

a. Given the necessary equipment and supplies, the student will process T.B. specimens for inoculation. Culture must yield growth and demonstrate the presence or absence of acid fast bacilli. (NOTE: It is not recommended that this procedure be performed in the student laboratory. The procedure should be performed only under hospital or medical laboratory supervision.)

b. Written examination: Evaluation will be based on criteria specified by the instructor.

TASK

MP-14. Processing anaerobic bacteria

PERFORMANCE OBJECTIVE

Recognize the principles and procedures necessary to process anaerobic bacteria.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Defining
    1. Anerobic
    2. Eh
b. Methods used to produce anaerobic environment
c. Purpose of an indicator in anaerobic broths
d. Methods of preparing anaerobic media
e. Findings (clinical) associated with anaerobic infections
f. Clostridium
    1. Categories of disease manifestation
    2. Mode of pathogenicity

(Continued on back)

Demonstration of Task:

By instructor

Laboratory Practice:

Clinical practicum will provide exposure to identification of anaerobics

INSTRUCTIONAL MATERIALS

Textbooks:

a. Bailey and Scott, Diagnostic Microbiology
b. Koneman, Color Atlas and Textbook of Diagnostic Microbiology

Equipment and Supplies:

a. Gas-Pac
b. Cylinder
c. Candlejar

LAB HOURS	1
CLASS HOURS	3

EVALUATION (MP-14)

Given the necessary information and related instruction, demonstrate a basic knowledge of the principles and procedures for processing anaerobic bacteria. Evaluation will be by written examination and based on criteria specified by the instructor.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

    3. Gram stain characteristics
    4. Colonial characteristics
    5. Carbohydrate fermentation
- g. Bacteroides
    1. Normal habitat
    2. Gram stain characteristics
    3. Culture characteristics
    4. Disease manifestations
- h. Fusobacterium
    1. Normal habitat
    2. Gram stain characteristics
    3. Presence with spirochete

TASK

MP-15 Preparing and staining slides by india ink method

PERFORMANCE OBJECTIVE

Prepare and stain slides by india ink method.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. *Cryptococcus neoformans*
b. Specimen handling
c. India ink preparation

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner perform India ink preparation.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Bailey and Scott, *Diagnostic Microbiology*
b. Koneman, *Color Atlas and Textbook of Diagnostic Microbiology*

Equipment and Supplies:

a. India ink
b. Specimen
c. Slides
d. Microscope
e. Loop
f. Bacti-cenerator

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LAB HOURS	1
CLASS HOURS	2

EVALUATION (MP-15)

a. Given the necessary equipment and supplies, the student will prepare and stain slides by India ink method. The capsules must be clear and outlined by a stippled background.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

TASK

MP-16 Preparing parastological "wet prep" slides

PERFORMANCE OBJECTIVE

Prepare "wet prep" slides.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Collection, transport and processing of specimens
b. Saline and iodine preparation
c. Concentration methods
d. Steps of procedure

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner perform saline and iodine preparation.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Bailey and Scott, Diagnostic Microbiology
b. Koneman, Color Atlas and Textbook of Diagnostic Microbiology

Equipment and Supplies:

a. Specimens
b. Saline
c. Lugol's iodine
d. Slides
e. Microscope
f. Centrifuge
g. Swabs
h. Glass funnel
i. Test tubes
j. Cover slip
k. Applicator sticks

LAB HOURS	2
CLASS HOURS	2

EVALUATION (MP-16)

Given the necessary equipment and supplies, the student will prepare parasitological "wet prep" slides on known positive specimens using saline or iodine solutions. The results must recover those parasites known to be in the original specimen.

TASK

MP-17. Performing cellulose tape techniques

PERFORMANCE OBJECTIVE

Perform a cellulose preparation and identify *Enterbius vermicularis* larvae.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

- a. *Enterbius vermicularis*
    - 1. Disease manifestation
    - 2. Mode of transmission
    - 3. Method of diagnosis
    - 4. Apperance of larvae and adult worm
- b. Scotch tape method
- c. Purpose of technique
- d. Steps of procedure

Demonstration of Task:

By instructor

Laboratory Practice:

Have student perform scotch tape preps and examine for larvae.

INSTRUCTIONAL MATERIALS

Textbooks:

- a. Bailey and Scott, *Diagnostic Microbiology*
- b. Koneman, *Color Atlas and Textbook of Diagnostic Microbiology*

Equipment and Supplies:

- a. Slides
- b. Scotch tape specimens
- c. Microscope

LAB HOURS	2
CLASS HOURS	2

EVALUATION (MP-17)

a. Given specimens suspicious of Enterbius vermicularis, the student will perform a scotch tape test. The readings, both positive and negative, must agree with those of the test control.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

TASK

MP-18 Preparing malaria smears

PERFORMANCE OBJECTIVE

Prepare thick and thin malaria smears.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Thick and thin smears
b. Plasmodium
    1. Disease manifestation
    2. General characteristics
    3. Methods of diagnosis
c. Steps of procedure

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner perform thick and thin smear preparations.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Bailey and Scott, Diagnostic Microbiology
b. Koneman, Color Atlas and Textbook of Diagnostic Microbiology

Equipment and Supplies:

a. Blood
b. Slides

LAB HOURS	2
CLASS HOURS	2

EVALUATION (MP-18)

Given the necessary supplies and equipment, the student will prepare a thick and thin malaria smear. The smear must meet specifications established by the instructor.

TASK

MP-19. Performing germ tube test

PERFORMANCE OBJECTIVE

Perform a germ tube test.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Mycotic infections
b. *Candida albicans*
    1. Disease manifestation
    2. General characteristics
    3. Methods of diagnosis

Demonstration of Task:

By instructor

Laboratory Practice:

Have learner perform germ tube tests.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Bailey and Scott, *Diagnostic Microbiology*
b. Koneman, *Color Atlas and Textbook of Diagnostic Microbiology*

Equipment and Supplies:

a. Yeast stock cultures
b. Human or rabbit serum
c. Incubator
d. Slides
e. Microscope

LAB HOURS	2
CLASS HOURS	2

EVALUATION (MP-19)

a. Given an isolated colony of the species Candida and the necessary equipment and supplies, the student will perform germ tube tests. The readings, both positive and negative, must agree with previously tested control organisms.

b. Written examination: Evaluation will be based on criteria specified by the instructor.

SECTION IV

CURRICULUM STRUCTURE, EXIT POINTS & COURSE OUTLINE

SECTION IV

Section IV Content List

Introduction to the Curriculum Structure
Curriculum Structure
  Group
  Individualized
Introduction to the Course Outline
Course Outline

Section III presented a sample organizational model for sequencing the instruction of program tasks. Based on that model, Section IV provides suggested methods of structuring the entire Medical Laboratory Technician curriculum.

INTRODUCTION TO THE CURRICULUM STRUCTURE

A curriculum structure is developed by sequencing duties into a logical teaching plan. Two curriculum structures are presented in this section - group and individualized.

The individualized structure also lists the duty areas, but does not include hours or quarters. Using the individualized approach, the student proceeds at his or her pace until each task is mastered.

In either type of structure, the duty areas can be rearranged to meet local needs..

MEDICAL LABORATORY TECHNICIAN SUGGESTED CURRICULUM STRUCTURE*

Course	Class Hours	Lab Hours	Total Hours
First Quarter			
Orientation to Medical Laboratory Technology	21	44	65
Integrated Health	80	0	80
Urinalysis Procedures	30	22	52
Immunohematology Procedures	65.5	51.5	117
	196.5	117.5	314
Second Quarter			
Hematology Procedures	52	40	92
Clinical Chemistry and Instrumentation	104	41	145
Microbiology Procedures	47	33	80
	203	114	317
Third and Fourth Quarter			
Medical Laboratory Applications	0	80	80
Clinical Practicum	0	800	800
		880	880

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*This curriculum structure is designeed to be used for group instruction.

MEDICAL LABORATORY TECHNICIAN SUGGESTED CURRICULUM STRUCTURE*

Orientation to Medical Laboratory Technician
Integrated Health
Urinalysis Procedures
Immunohematology Procedures
Hematology Procedures
Clinical Chemistry and Instrumentation
Microbiology Procedures

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*This curriculum structure is designed to be used for individualized instruction.

INTRODUCTION TO THE COURSE OUTLINE

A course outline suggests a method of sequencing tasks for instruction. In the following outline, the unit guide tasks are ordered according to duty areas. The tasks are then arranged from general to specific knowledge and applications. The instructor is not restricted to using this specific outline, but may adapt it to meet his or her teaching needs.

The following course outline is designed for group instruction, however, it may be adapted for individualized instruction by eliminating the time sequencing for tasks.

Most Medical Laboratory Technician programs are associate degree programs. The course outline lists only the technical courses required for certification. Courses required for an associate degree must be established by the institution conferring the degree.

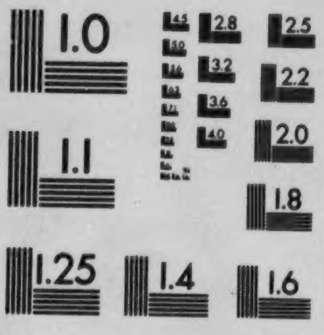
MEDICAL LABORATORY TECHNICIAN SUGGESTED COURSE OUTLINE

Quarter I

Task	Title	Class Hours	Lab Hours
	DUTY I: ORIENTATION TO MEDICAL LABORATORY TECHNOLOGY		
0-1	Orienting students to school policies and the medical laboratory	15	
0-2	Performing calculations and conversions using the English and metric systems	6	
0-3	Converting temperatures from all three recognized temperature scales	3	
0-4	Cleaning glassware		5
0-5	Operating centrifuge		3
0-6	Operating a microscope		5
0-7	Performing venipuncture		7
0-8	Performing capillary puncture		2
0-9	Performing and plating blood dilutions		6
0-10	Operating a spectrophotometer		4
0-11	Performing serial dilution		3
0-12	Performing pipetting		2
0-13	Operating a double pan balance and weighing dry chemicals		4
		24	41
	DUTY II: INTEGRATED HEALTH		
IH-1	Describing the basic chemistry of the body	10	
IH-2	Describing basic microbiology	6	
IH-3	Describing the general plan and structural units of the body	5	
IH-4	Describing the nervous system and endocrine system	8	
IH-5	Describing the cardiovascular system and blood	6	
IH-6	Describing systems and tissues that protect the body	5	
IH-7	Describing sensory receptors and sense organs	6	
IH-8	Describing bones and muscles	8	
IH-9	Describing the regulation of the body's internal enviornment	10	
IH-10	Describing digestion, absorption and assimilation of food and the elimination of body waste	8	
IH-11	Describing the reproductive system	8	
		80	

2

B.M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1.4
1.6

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS
STANDARD REFERENCE MATERIAL 1010a
(ANSI and ISO TEST CHART No. 2)

Task	Title	Class Hours	Lab Hours
	DUTY III: URINALYSIS PROCEDURES		
UP-1	Recognizing the anatomy and physiology of the urinary system	5	
UP-2	Understanding the techniques of proper specimen handling	5	
UP-3	Performing physical examinations of urine	2	4
UP-4	Performing routine chemical analysis of urine by dipstick	10	4
UP-5	Performing protein tests by turbidimetric methods	1	2
UP-6	Performing clinitests	1	2
UP-7	Performing microscopic examinations of urinary sediment	6	10
		30	22
	DUTY IV: IMMUNOHEMATOLOGY PROCEDURES		
IHP-1	Recognizing the importance of the immune process	10	
IHP-2	Recognizing the basic theory of genetics	7	
IHP-3	Screening donors for phlebotomy	2	3
IHP-4	Performing first aid for donor reactions	2	
IHP-5	Drawing blood from donors	2	
IHP-6	Preparing special blood components	3	2
IHP-7	Organizing and storing blood	1	2
IHP-8	Preparing blood for shipment	1	1
IHP-9	Preparing and reporting agglutination reactions for blood bank procedures	1	4
IHP-10	Performing ABO grouping	5	5
IHP-11	Performing Rh testing	5	5
IHP-12	Performing direct and indirect Coombs test (antiglobin test)	3	2
IHP-13	Performing antibody screening tests	3	2
IHP-14	Performing antibody identifications	1	4
IHP-15	Performing antibody titers (dilution)	1	3
IHP-16	Crossmatching blood - compatibility testing	2	4
IHP-17	Performing immune globulin crossmated	2	1
IHP-18	Investigating transfusion reactions	1	1
IHP-19	Performing quality control procedures	1	3
IHP-20	Performing screening tests for supplies	6	4
IHP-21	Performing ferbile agglutination series	1	1
IHP-22	Performing Rheumatic Arthritis test (RA)	½	½
IHP-23	Performing antistreptodysin "O" tests and titers	1	1
IHP-24	Performing C-reactive protein (CRP) tests	½	½
IHP-25	Performing slide agglutination tests for mononucleosis	1	1

Task	Title	Class Hours	Lab Hours
IHP-26	Performing slide and tube pregnancy tests	½	½
IHP-27	Performing cold agglutinin test	1	1
		64.5	51.5
	Total Quarter I Class and Lab Hours	199.5	114.5
	Total Quarter I Instructional Time	314	

Quarter II

Task	Title	Class Hours	Lab Hours
	DUTY I: HEMATOLOGY PROCEDURES		
HP-1	Recognizing proper anticoagulants	3	
HP-2	Preparing and staining blood smears	2	3
HP-3	Performing cell counts	2	1
HP-4	Performing hemoglobin tests (Cyanmethemoglobin Method)	3	1
HP-5	Performing hematocrit tests	1	1
HP-6	Calculating erythrocyte indices	3	
HP-7	Performing erythrocyte sedimentation rates (ESR)	1	1
HP-8	Performing erythrocyte osmatic fragility tests	1	1
HP-9	Performing reticulocyte counts	1	2
HP-10	Recognizing normal characteristics of erythrocytes	3	3
HP-11	Recognizing normal characteristics of leukocytes	4	4
HP-12	Performing platelet counts and slide evaluations	2	2
HP-13	Performing differential cell counts	2	8
HP-14	Recognizing characteristics of leukocyte disorders	5	4
HP-15	Recognizing erythrocyte disorders	4	2
HP-16	Performing sickle cell tests	2	1
HP-17	Performing lupus erythematosus (LE) tests	1	1
HP-18	Performing peroxidase stains	½	½
HP-19	Performing leukocyte alkaline phosphatase (LAP) stains	½	½
HP-20	Recognizing fundamentals of coagulation	5	
HP-21	Performing prothrombin time tests	1	1
HP-22	Performing thromboplastin time (PTT) tests (activated)	1	1
HP-23	Determining clotting times	1	1
HP-24	Performing bleeding times	1	1
HP-25	Recognizing principles of miscellaneous coagulation procedures	2	
		52	40
	DUTY II: CLINICAL CHEMISTRY AND INSTRUMENTATION		
CCI-1	Recognizing safety measures necessary to the clinical chemistry laboratory	4	
CCI-2	Performing quality control	10	
CCI-3	Performing laboratory mathematics	10	
CCI-4	Recognizing types of instrumentation	6	
CCI-5	Performing tests using Beer's law	5	
CCI-6	Preparing calibration curves	2	4

Task	Title	Class Hours	Lab Hours
CCI-7	Performing protein tests	4	4
CCI-8	Performing blood urea nitrogen (BUN) tests	3	2
CCI-9	Performing creatinine tests	2	2
CCI-10	Performing uric acid tests	2	2
CCI-11	Performing glucose tests	3	3
CCI-12	Performing glucose tolerance tests	3	3
CCI-13	Performing bilirubin tests - direct and indirect	4	4
CCI-14	Performing lipid tests	4	4
CCI-15	Performing electrolyte tests	10	8
CCI-16	Describing blood gas analysis	10	
CCI-17	Performing enzyme tests	12	6
CCI-18	Describing endocrine tests	5	
CCI-19	Describing toxicology tests	4	
CCI-20	Performing gastric analyses	1	2
		104	44
	DUTY III: MICROBIOLOGY PROCEDURES		
MP-1	Performing sterilization	2	1
MP-2	Preparing basic media	1	2
MP-3	Performing proper specimen handling	1	1
MP-4	Streaking plates	1	1
MP-5	Performing initial plating of cultures on appropriate media	2	1
MP-6	Preparing and staining slides by Gram stain method	2	2
MP-7	Performing biochemical identification of pathogenic gram positive cocci	5	4
MP-8	Performing identification of gram positive rods	2	
MP-9	Performing biochemical identification system on gram negative cocci	2	3
MP-10	Performing biochemical identification system on gram negative rod	9	6
MP-11	Performing identification of gram negative coccibacillus	3	
MP-12	Performing antiobiotic susceptibility test	2	2
MP-13	Processing T.B. specimens for inoculating	2	
MP-14	Processing anaerobic bacteria	3	1
MP-15	Preparing and staining slides by	2	1
MP-16	Preparing parastological "wet prep" slides	2	2
MP-17	Performing cellulose tape techniques	2	2
MP-18	Preparing malaria smears	2	2
MP-19	Performing germ tube tests	2	2
		47	33

Total Quarter II Lab and Class Hours	203	117
Total Quarter II Instructional Time	317	

Quarters III and IV

Title	Class Hours	Lab Hours
Medical Laboratory Applications (Laboratory practice provides and opportunity for the students to increase their proficiency in performing laboratory tests and before beginning their clinical practicum.)		80
Clinical Practicum		800
Clinical rotation in the following medical laboratory areas:		
1. Urinalysis		80
2. Clinical Chemistry and Instrumentation		200
3. Hematology		160
4. Microbiology		160
5. Immunohematology		200

SECTION V

RECORDS

SECTION V

Section V Content List

Individualized Competency Record
Group Progress Chart

Section V presents suggested ways of recording and documenting the progress of students through the curriculum. The recommended procedures include options for both individual and group records. The very important function of communicating the student's qualifications to potential employers is handled clearly and efficiently by the use of the Certificate of Competency, which is also described in this section.

RECORDS MANAGEMENT

This guide provides a series of easy to use documents that will aid the instructor in recordkeeping and that will be beneficial to the student in entering the work force.

In addition to providing the instructor with an "at a glance" assessment of individual and/or group progress, a Certificate of Competency, which can be used by students seeking employment, is included.

The group progress chart reflects individual task completion of all students. Due to confidentiality of records, grades must not be recorded on the chart. A notation indicating task completion (i.e., x or check) should be used.

INSTRUCTIONS

Instructions

Competency Checklist

1) Enter the student's name.
2) Enter the date and instructor's initials as each unit of instruction is completed.

The Competency Checklist automatically indicates when all the requirements for each DOT exit point or job title have been completed by the student. At each point on the certificate where an asterisk appears, the student is eligible to receive a Certificate of Competency.

Certificate of Competency

A Certificate of Competency is to be issued for each job title for which a student is qualified.

1) Enter the student's name.
2) Enter the school's name
3) Sign and date the form.

A Certificate of Competency may be issued at the time a student qualifies for it, or all certificates for which a student qualifies may be issued to the student when he/she completes or leaves the program.

Group Progress Chart

1) Enter all program tasks across top of matrix.
2) Enter the students' names down the left hand side of matrix.
3) As each student completes a task, a notation should be made in the square which corresponds with the task and the student's name.

COMPETENCY CHECKLIST

PROGRAM: MEDICAL LABORATORY TECHNICIAN

STUDENT NAME: ____________________________

TASK NO.	JOB COMPETENCIES	DATE	IN'T	EXIT POINT DOT NO. 078.381-014 JOB TITLE Medical Laboratory Technician
	ORIENTATION TO MEDICAL LABORATORY TECHNOLOGY			
O-1	Orienting students to school policies and the medical laboratory			X
O-2	Performing calculations and conversions using the English and metric systems			X
O-3	Converting temperatures from all three recognized temperature scales			X
O-4	Cleaning glassware			X
O-5	Operating centrifuge			X
O-6	Operating a microscope			X
O-7	Performing venipuncture			X
O-8	Performing capillary puncture			X
O-9	Performing and plating blood dilutions			X
O-10	Operating a spectrophotometer			X
O-11	Performing serial dilutions			X
O-12	Performing pipetting			X
O-13	Operating a double pan balance and weighing dry chemicals			X
	INTEGRATED HEALTH			
IH-1	Describing the basic chemistry of the body			X
IH-2	Describing basic microbiology			X
IH-3	Describing the general plan and structural units of the body			X
IH-4	Describing the nervous system and endocrine system			X
IH-5	Describing the cardiovascular system and blood			X
IH-6	Describing systems and tissues that protect the body			X
IH-7	Describing sensory receptors and sense organs			X
IH-8	Describing bones and muscles			X
IH-9	Describing the regulation of the body's internal environment			X
IH-10	Describing digestion, absorption and assimilation of food and the elimination of body waste			X
IH-11	Describing the reproductive system			X
	URINALYSIS PROCEDURES			
UP-1	Recognizing the anatomy and physiology of the urinary system			X
UP-2	Understanding the techniques of proper specimen handling			X
UP-3	Performing physical examinations of urine			X
UP-4	Performing routine chemical analysis of urine by dipstick			X
UP-5	Performing protein tests by turbidimetric methods			X
UP-6	Performing clinitests			X
UP-7	Performing microscopic examinations of urinary sediment			X
	IMMUNOHEMATOLOGY PROCEDURES			
IHP-1	Recognizing the importance of the immune process			X
IHP-2	Recognizing the basic theory of genetics			X
IHP-3	Screening donors for phlebotomy			X
IHP-4	Performing first aid for donor reactions			X
IHP-5	Drawing blood from donors			X
IHP-6	Preparing special blood components			X
IHP-7	Organizing and storing blood			X
IHP-8	Preparing blood for shipment			X
IHP-9	Preparing and reporting agglutination reactions for blood bank procedures			X
IHP-10	Performing ABO grouping			X
IHP-11	Performing Rh testing			X
IHP-12	Performing direct and indirect Coombs test (antiglobin test)			X
IHP-13	Performing antibody screening tests			X
IHP-14	Performing antibody identifications			X
IHP-15	Performing antibody titers (dilution)			X
IHP-16	Crossmatching blood - compatibility testing			X

COMPETENCY CHECKLIST

EXIT POINT

PROGRAM: MEDICAL LABORATORY TECHNICIAN

STUDENT NAME:________________________

TASK NO.	JOB COMPETENCIES	DATE	IN'T.	DOT NO. 078.381-014 JOB TITLE Medical Laboratory Technician
IHP-17	Performing immune globulin crossmated			X
IHP-18	Investigating transfusion reactions			X
IHP-19	Performing quality control procedures			X
IHP-20	Performing screening tests for supplies			X
IHP-21	Performing ferbile agglutination series			X
IHP-22	Performing Rheumatic Arthritis test (RA)			X
IHP-23	Performing antistreptolysin "O" tests and titers			X
IHP-24	Performing C-reactive protein (CRP) tests			X
IHP-25	Performing slide agglutination tests for mononucleosis			X
IHP-26	Performing slide and tube pregnancy tests			X
IHP-27	Performing cold agglutinin test			X
	HEMATOLOGY PROCEDURES			
HP-1	Recognizing proper anticoagulants			X
HP-2	Preparing and staining blood smears			X
HP-3	Performing cell counts			X
HP-4	Performing hemoglobin tests (Cyanmethemoglobin Method)			X
HP-5	Performing hematocrit tests			X
HP-6	Calculating erythrocyte indices			X
HP-7	Performing erythrocyte sedimentation rates (ESR)			X
HP-8	Performing erythrocyte osmatic fragility tests			X
HP-9	Performing reticulocyte counts			X
HP-10	Recognizing normal characteristics of erythrocytes			X
HP-11	Recognizing normal characteristics of leukocytes			X
HP-12	Performing platelet counts and slide evaluations			X
HP-13	Performing differential cell counts			X
HP-14	Recognizing characteristics of leukocyte disorders			X
HP-15	Recognizing erythrocyte disorders			X
HP-16	Performing sickle cell tests			X
HP-17	Performing lupus erythematosus (LE) tests			X
HP-18	Performing peroxidase stains			X
HP-19	Performing leukocyte alkaline phosphatase (LAP) stains			X
HP-20	Recognizing fundamentals of coagulation			X
HP-21	Performing prothrombin time tests			X
HP-22	Performing thromboplastin time (PTT) tests (activated)			X
HP-23	Determining clotting times			X
HP-24	Performing bleeding times			X
HP-25	Recognizing principles of miscellaneous coagulation procedures			X
	CLINICAL CHEMISTRY AND INSTRUMENTATION			
CCI-1	Recognizing safety measures necessary to the clinical chemistry laboratory			X
CCI-2	Performing quality control			X
CCI-3	Performing laboratory mathematics			X
CCI-4	Recognizing types of instrumentation			X
CCI-5	Performing tests using Beer's law			X
CCI-6	Preparing calibration curves			X
CCI-7	Performing protein tests			X
CCI-8	Performing blood urea nitrogen (BUN) tests			X
CCI-9	Performing creatinine tests			X
CCI-10	Performing uric acid tests			X
CCI-11	Performing glucose tests			X
CCI-12	Performing glucose tolerance tests			X
CCI-13	Performing bilirubin tests - direct and indirect			X

COMPETENCY CHECKLIST

PROGRAM: MEDICAL LABORATORY TECHNICIAN

STUDENT NAME:____________________________

TASK NO.	JOB COMPETENCIES	DATE	IN'T.	EXIT POINT
			DOT NO.	078.381-014
			JOB TITLE	Medical Laboratory Technician
CCI-14	Performing lipid tests			X
CCI-15	Performing electrolyte tests			X
CCI-16	Describing blood gas analysis			X
CCI-17	Performing enzyme tests			X
CCI-18	Describing endocrine tests			X
CCI-19	Describing toxicology tests			X
CCI-20	Performing gastric analyses			X
	MICROBIOLOGY PROCEDURES			
MP-1	Performing sterilization			X
MP-2	Preparing basic media			X
MP-3	Performing proper specimen handling			X
MP-4	Streaking plates			X
MP-5	Performing initial plating of cultures on appropriate media			X
MP-6	Preparing and staining slides by Gram stain method			X
MP-7	Performing biochemical identification of pathogenic gram positive cocci			X
MP-8	Performing identification of gram positive rods			X
MP-9	Performing biochemical identification system on gram negative cocci			X
MP-10	Performing biochemical identification system on gram negative rod			X
MP-11	Performing identification of gram negative coccibacillus			X
MP-12	Performing antiobiotic susceptiblility test			X
MP-13	Processing T.B. specimens for inoculating			X
MP-14	Processing anaerobic bacteria			X
MP-15	Preparing and staining slides by India ink method			X
MP-16	Preparing parastological "wet prep" slides			X
MP-17	Performing cellulose tape techniques			X
MP-18	Preparing malaria smears			X
MP-19	Performing germ tube tests			*X

This is to certify that the above named student has demonstrated proficiency in the performance of the competencies and/or tasks indicated above. These competencies and/or tasks have been determined to be the skills and knowledge that are necessary for entry level employment into the job classifications indicated.

Date____________________ Instructor______________________________

School______________________________

Instructor______________________________

Instructor______________________________

Instructor______________________________

Instructor______________________________

*Certificate of Competency can be issued

COMPETENCY CHECKLIST

PROGRAM: MEDICAL LABORATORY TECHNICIAN

STUDENT NAME:____________________________

TASK NO.	JOB COMPETENCIES	DATE	IN'T.	EXIT POINT DOT NO. 078.381-014 JOB TITLE Medical Laboratory Technician
CCI-14	Performing lipid tests			X
CCI-15	Performing electrolyte tests			X
CCI-16	Describing blood gas analysis			X
CCI-17	Performing enzyme tests			X
CCI-18	Describing endocrine tests			X
CCI-19	Describing toxicology tests			X
CCI-20	Performing gastric analyses			X
	MICROBIOLOGY PROCEDURES			
MP-1	Performing sterilization			X
MP-2	Preparing basic media			X
MP-3	Performing proper specimen handling			X
MP-4	Streaking plates			X
MP-5	Performing initial plating of cultures on appropriate media			X
MP-6	Preparing and staining slides by Gram stain method			X
MP-7	Performing biochemical identification of pathogenic gram positive cocci			X
MP-8	Performing identification of gram positive rods			X
MP-9	Performing biochemical identification system on gram negative cocci			X
MP-10	Performing biochemical identification system on gram negative rod			X
MP-11	Performing identification of gram negative coccibacillus			X
MP-12	Performing antiobiotic susceptiblility test			X
MP-13	Processing T.B. specimens for inoculating			X
MP-14	Processing anaerobic bacteria			X
MP-15	Preparing and staining slides by India ink method			X
MP-16	Preparing parastological "wet prep" slides			X
MP-17	Performing cellulose tape techniques			X
MP-18	Preparing malaria smears			X
MP-19	Performing germ tube tests			*X

This is to certify that the above named student has demonstrated proficiency in the performance of the competencies and/or tasks indicated above. These competencies and/or tasks have been determined to be the skills and knowledge that are necessary for entry level employment into the job classifications indicated.

Date____________________ Instructor____________________________

School____________________________

Instructor____________________________

Instructor____________________________

Instructor____________________________

Instructor____________________________

*Certificate of Competency can be issued

CERTIFICATE OF COMPETENCY

This is to Certify that

of

has successfully mastered the competencies required to perform the job of

MEDICAL LABORATORY TECHNICIAN

The student named on this certificate has demonstrated mastery of the following unit level competencies required to perform the job of Medical Laboratory Technician.

MEDICAL LABORATORY TECHNICIAN
D.O.T. Code 078.381-014

Orientation to Medical Laboratory Technology

Orienting students to school policies and the medical laboratory
Performing calculations and conversions using the English and metric systems
Converting temperatures from all three recognized temperature scales
Cleaning glassware
Operating centrifuge
Operating a microscope
Performing venipuncture
Performing capillary puncture
Performing and plating blood dilutions
Operating a spectrophotometer
Performing serial dilutions
Performing pipetting
Operating a double pan balance and weighing dry chemicals

Integrated Health

Describing the basic chemistry of the body
Describing basic microbiology

Performing first aid for donor reactions
Drawing blood from donors
Preparing special blood components
Organizing and storing blood
Preparing blood for shipment
Preparing and reporting agglutination reactions for blood bank procedures
Performing ABO grouping
Performing Rh testing
Performing direct and indirect Coombs test (antiglobin test)
Performing antibody screening tests
Performing antibody identifications
Performing antibody titers (dilution)
Crossmatching blood - compatibility testing
Performing immune globulin crossmated
Investigating transfusion reactions
Performing quality control procedures
Performing screening tests for supplies
Performing ferbile agglutination series
Performing Rheumatic Arthritis test (RA)
Performing antistreptodysin "O" tests and titers

Performing thromboplastin time (PTT) tests (activated)
Determining clotting times
Performing bleeding times
Recognizing principles of miscellaneous coagulation procedures

Clinical Chemistry and Instrumentation

Recognizing safety measures necessary to the clinical chemistry laboratory
Performing quality control
Performing laboratory mathematics
Recognizing types of instrumentation
Performing tests using Beer's law
Preparing calibration curves
Performing protein tests
Performing blood urea nitrogen (BUN) tests
Performing creatinine tests
Performing uric acid tests
Performing glucose tests
Performing glucose tolerance tests
Performing bilirubin tests - direct and indirect
Performing lipid tests

Describing the general plan and structural units of the body
Describing the nervous system and endocrine system
Describing the cardiovascular system and blood
Describing systems and tissues that protect the body
Describing sensory receptors and sense organs
Describing bones and muscles
Describing the regulation of the body's internal environment
Describing digestion, absorption and assimilation of food and the elimination of body waste
Describing the reproductive system
Recognizing the anatomy and physiology of the urinary system
Understanding the techniques of proper specimen handling
Performing physical examinations of urine
Performing routine chemical analysis of urine by dipstick
Performing protein tests by turbidimetric methods
Performing clinitests
Performing microscopic examinations of urinary sediment

Immunohematology Procedures

Recognizing the importance of the immune process
Recognizing the basic theory of genetics
Screening donors for phlebotomy
Performing C-reactive protein (CRP) tests
Performing slide agglutination tests for mononucleosis

Hematology Procedures

Recognizing proper anticoagulants
Preparing and staining blood smears
Performing cell counts
Performing hemoglobin tests (Cyanmethemoglobin Method)
Performing hematocrit tests
Calculating erythrocyte indices
Performing erythrocyte sedimentation rates (ESR)
Performing erythrocyte osmatic fragility tests
Performing reticulocyte counts
Recognizing normal characteristics of erythrocytes
Recognizing normal characteristics of leukocytes
Performing platelet counts and slide evaluations
Performing differential cell counts
Recognizing characteristics of leukocyte disorders
Recognizing erythrocyte disorders
Performing sickle cell tests
Performing lupus erythematosus (LE) tests
Performing peroxidase stains
Performing leukocyte alkaline phosphatase (LAP) stains
Recognizing fundamentals of coagulation
Performing prothrombin time tests
Performing electrolyte tests
Describing blood gas analysis
Performing enzyme tests
Describing endocrine tests
Describing toxicology tests
Performing gastric analyses

Microbiology Procedures

Performing sterilization
Preparing basic media
Performing proper specimen handling
Streaking plates
Performing initial plating of cultures on appropriate media
Preparing and staining slides by Gram stain method
Performing biochemical identification of pathogenic gram positive cocci
Performing identification of gram positive rods
Performing biochemical identification system on gram negative cocci
Performing biochemical identification system on gram negative rod
Performing identification of gram negative coccibacillus
Performing antiobiotic susceptibility test
Processing T.B. specimens for inoculating
Processing anaerobic bacteria
Preparing and staining slides by India ink method
Preparing parastological "wet prep" slides
Performing cellulose tape techniques
Preparing malaria smears
Performing germ tube tests

GROUP PROGRESS CHART

V-15

NAME	UNITS/TASKS																				

SECTION VI

FACILITIES

SECTION VI

Section VI Content List

Group Instruction Facilities
Individualized Instruction Facilities

The facility layouts on the following pages are presented to aid in arranging the classroom and laboratory for efficient instruction. The school administration and program instructor must determine an arrangement that best fits the needs of the students by determining the most efficient use of resources available to them not only in the laboratory, but also in the Learning Resource Center settings.

FACILITY LAYOUTS

The layouts on the following pages illustrate how facilities for group and individualized instructional programs may be planned and set up.

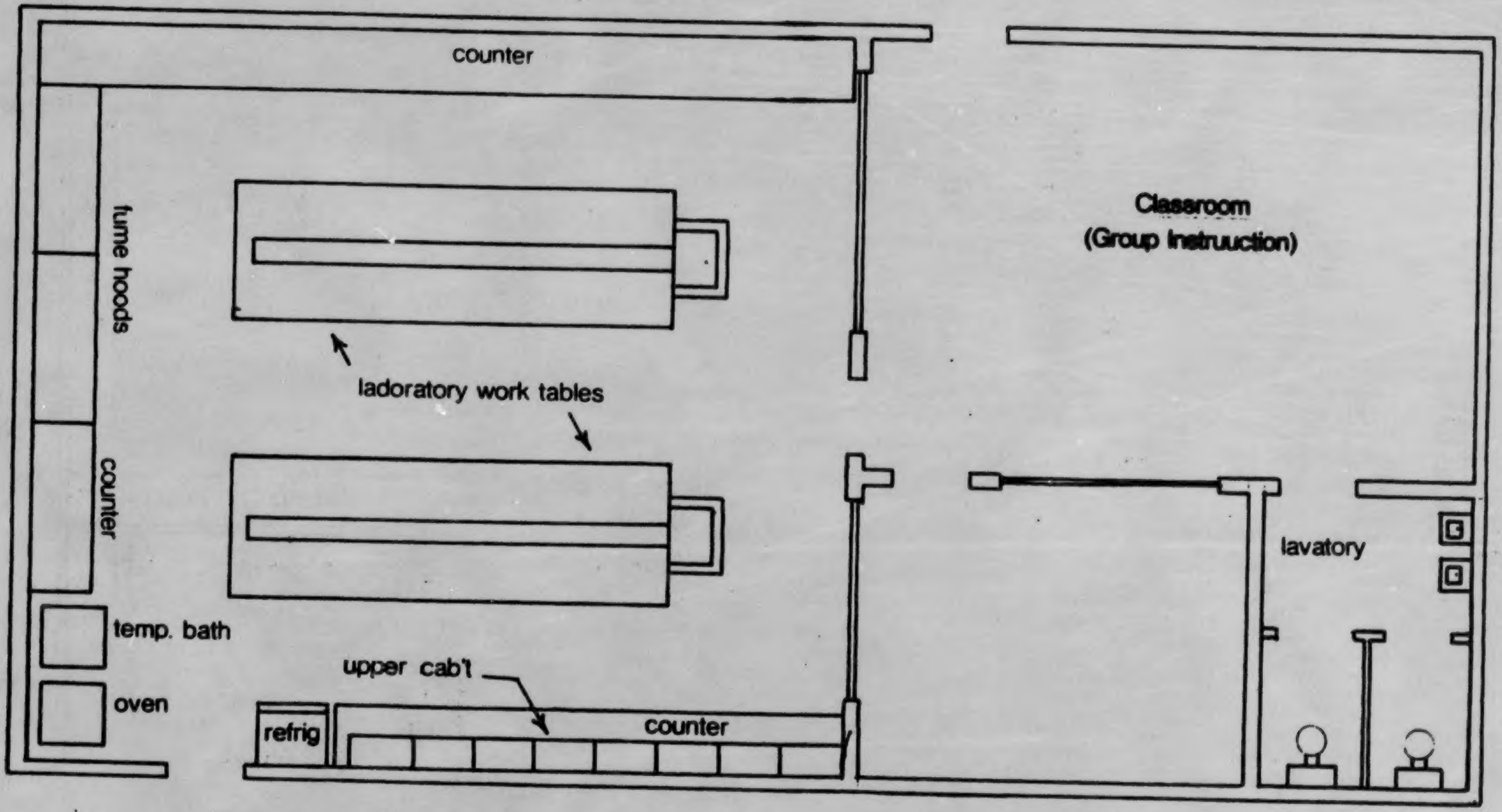
Each instructional approach has two important physical areas. These are (1) the laboratory (work) area and classroom for group instruction and (2) the laboratory (work) area and learning resource center (LRC) for individualized instruction.

The instructional setting for group instruction is based on that of a traditional classroom. This approach is easily set up and includes little or no modifications. The primary modes of learning are instructor lectures, occasional use of audiovisual aids and student participation. Ideally, all students progress at the same pace.

The instructional setting for individual instruction is designed to facilitate a student self-paced progression of learning. The LRC requires careful planning in utilizing available space. When planning to install an individual instruction program in an area not originally designed for this approach, the instructional setting may need modifications. Desks may be replaced with study carrels to allow students to simultaneously participate in a variety of learning activities. A group session area for small group gatherings should also be included. Because the instructor and students rarely meet together as a group, a bulletin board becomes a vital communication device in an LRC. It can be used to post announcements and such instructional information as group progress charts, assignments, positions available in the industry and safety rules.

A variety of references, resources and media equipment should be made available to the student. Therefore, an adequate amount of storage area should be included in planning the LRC. Every specific school and department has unique physical layout characteristics and problems. Through innovation, these features may be transformed into LRC advantages rather than disadvantages.

The manner in which the laboratory (work) area is planned and set up need not be affected by the type of instructional approach used by an instructor; it could/will be the same. Some major concerns in the laboratory are: 1) the instructor must always have a clear line of sight to each and every workstation, 2) tools must be accessible to students, but under the control of the instructor and 3) all supplies and materials required for the day's activities must be on hand and ready to use.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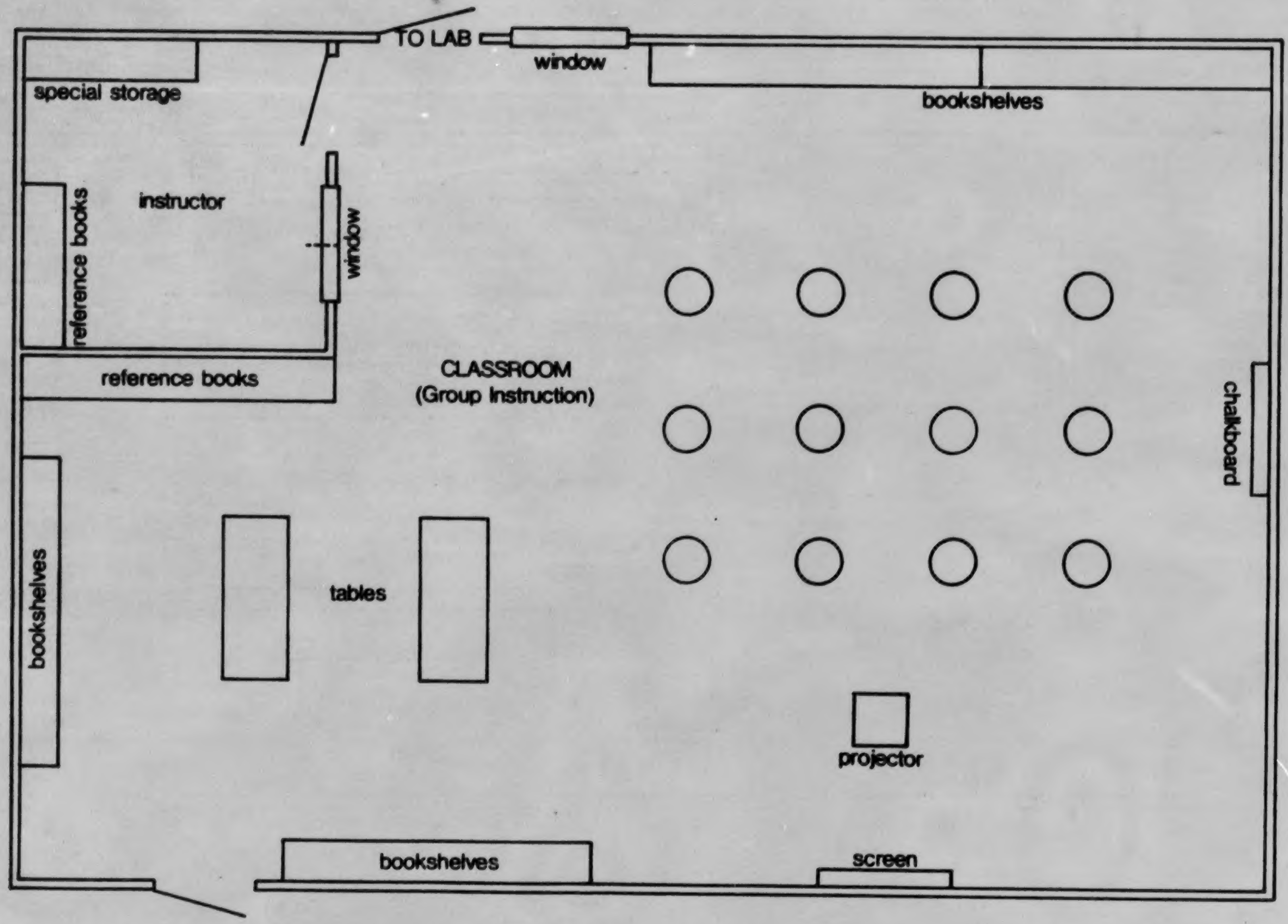
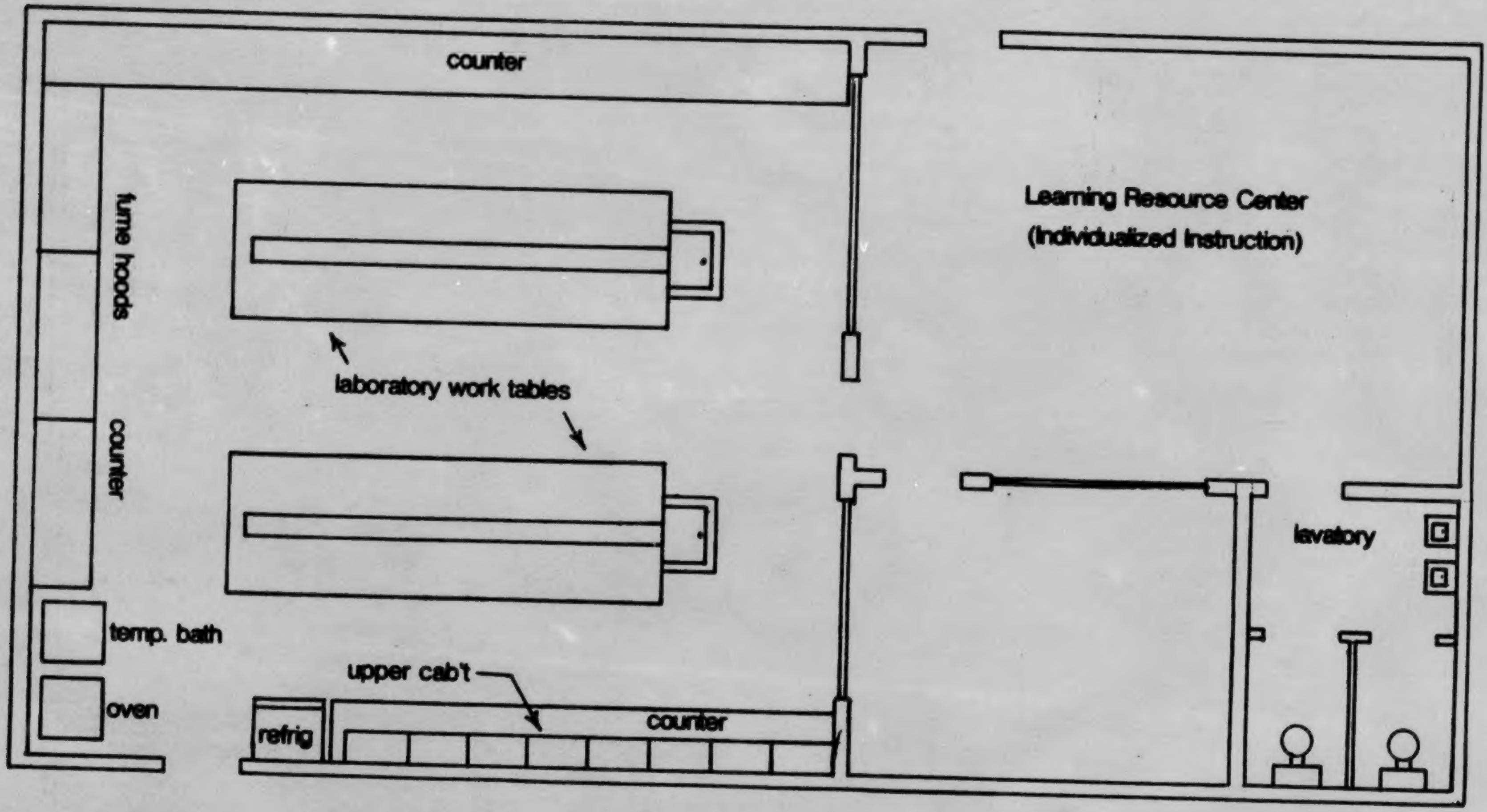
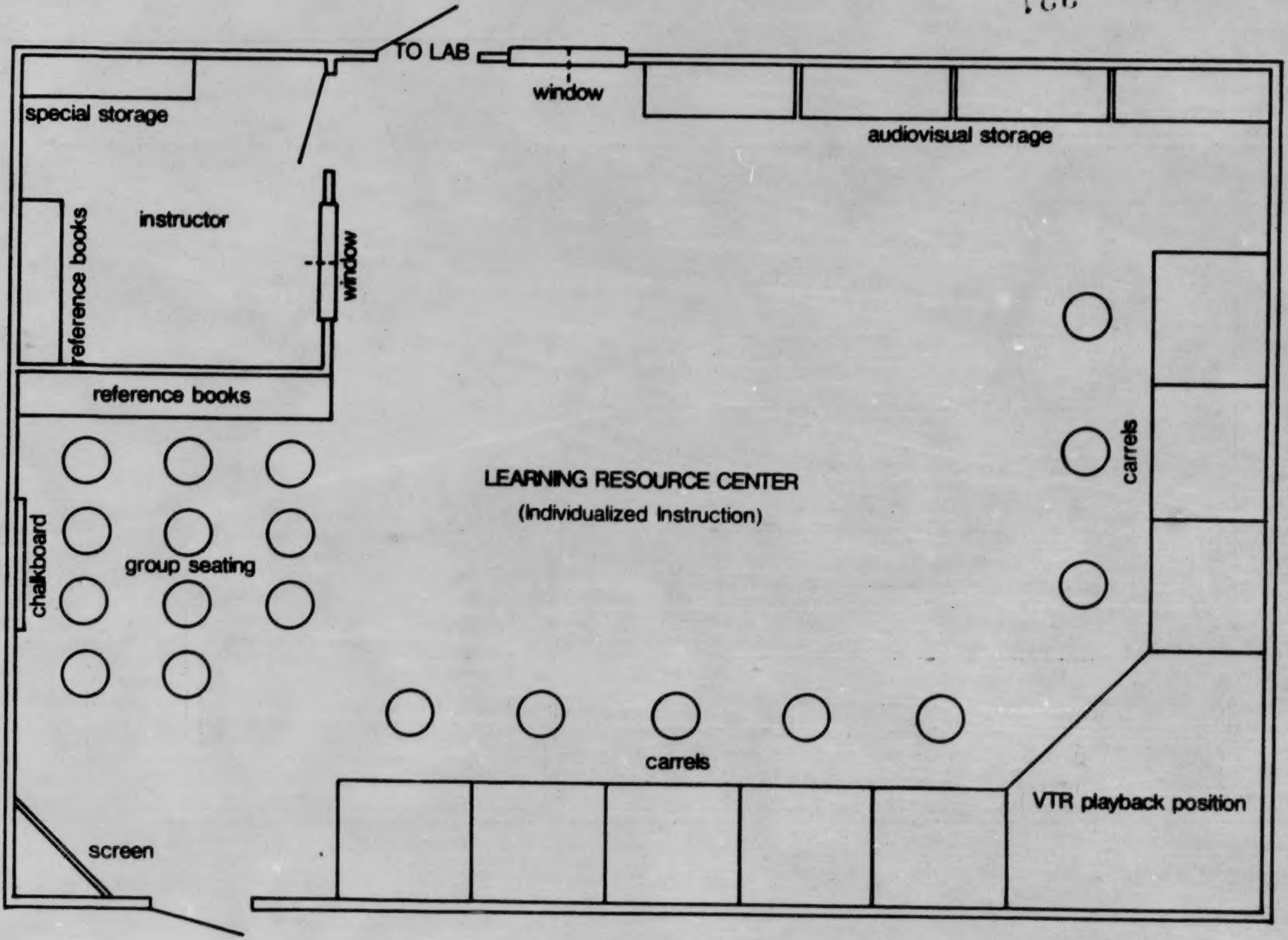
fume hoods
counter
temp. bath
oven
ladoratory work tables
upper cab't
refrig
counter
Classroom
(Group Instruuction)
lavatory


TO LAB
window
special storage
bookshelves
instructor
reference books
window
CLASSROOM
(Group Instruction)
chalkboard
reference books
bookshelves
tables
projector
bookshelves
screen


counter
fume hoods
counter
laboratory work tables
temp. bath
oven
upper cab't
refrig
counter
Learning Resource Center
(Individualized Instruction)
lavatory


TO LAB
window
special storage
audiovisual storage
instructor
reference books
window
reference books
LEARNING RESOURCE CENTER
(Individualized Instruction)
carrels
chalkboard
group seating
carrels
VTR playback position
screen

APPENDIX A

Resources

RESOURCES

This appendix contains the instructional resource matrix, unit guide references, additional instructional materials and a list of resource addresses.

The instructional resource matrix lists the audiovisuals, textbooks and student manuals for each task referenced on the unit guide sheets. The audiovisual format is identified by symbols such as: filmstrip (FS), slide/script (SS), slide/tape (ST), 16mm movie film (MF), transparency (TR), video tape (VT) and filmloop (FL), etc. The producer, title and number of the A/V is also given.

The unit guide bibliography lists textbooks, audiovisuals, student manuals and evaluation materials cited in the unit guides section.

The additional instructional materials is a compilation of textbooks and audiovisuals not included in the unit guides but beneficial to educators.

Resources addresses for all references concludes this appendix.

CURRICULUM AREA: MEDICAL LAB TECHNICIAN

TASK LISTING	INSTRUCTIONAL MATERIAL REFERENCES		
	Audiovisuals	Textbooks	Student Materials
O-1 Orienting students to school policies and the medical laboratory profession		Lee: The Lab Aide; American Red Cross	
O-2 Performing calculations and conversions using the metric and English measurement systems		Any basic chemistry book	
O-3 Converting temperatures from all three recognized temperature scales		Any basic chemistry book	
O-4 Cleaning glassware			
O-5 Operating centrifuge		Operator's manual	
O-6 Operating a microscope		Microscope manual	
O-7 Performing venipuncture		Seivard: Hematoloty for Medical Technologist	
O-8 Performing capillary puncture		Seivard: Hematology for Medical Technologist	
O-9 Performing and plating blood dilutions		Hyun, Ashton and Dolan: Practical Hematology	
O-10 Operating a spectrophotometer		Instrument operational manual	
O-11 Performing serial dilutions		Annino: Clinical Chemistry: Principles and Procedures	

CURRICULUM AREA: MEDICAL LAB TECHNICIAN

TASK LISTING	INSTRUCTIONAL MATERIAL REFERENCES		
	Audiovisuals	Textbooks	Student Materials
O-12 Performing pipetting			
O-13 Operating a double pan balance and weighing dry chemicals			

A-5

CURRICULUM AREA: MEDICAL LAB TECHNICIAN

TASK LISTING	INSTRUCTIONAL MATERIAL REFERENCES		
	Audiovisuals	Textbooks	Student Materials
IH-1 Describing basic chemistry of the body		Lankford: Integrated Science for Health Students	
IH-2 Describing basic microbiology		Lankford: Integrated Science for Health Students	
IH-3 Describing the general plan and structural units of the body		Lankford: Integrated Science for Health Students	
IH-4 Describing the nervous system and endocrine system		Lankford: Integrated Science for Health Students	
IH-5 Describing the cardiovascular system		Lankford: Integrated Science for Health Students	
IH-6 Describing systems and tissues that protect the body		Lankford: Integrated Science for Health Students	
IH-7 Describing sensory receptors and sense organs		Lankford: Integrated Science for Health Students	
IH-8 Describing bones and muscles and how they produce movement		Lankford: Integrated Science for Health Students	
IH-9 Describing the regulation of the body's internal environment		Lankford: Integrated Science for Health Students	

CURRICULUM AREA: MEDICAL LAB TECHNICIAN

TASK LISTING	INSTRUCTIONAL MATERIAL REFERENCES		
	Audiovisuals	Textbooks	Student Materials
IH-10 Describing digestion, absorption and assimilation of food and the elimination of body waste		Lankford: Integrated Science for Health Students	
IH-11 Describing the reproductive system		Lankford: Integrated Science for Health Students	

CURRICULUM AREA: MEDICAL LAB TECHNICIAN

TASK LISTING		INSTRUCTIONAL MATERIAL REFERENCES		
		Audiovisuals	Textbooks	Student Materials
UP-1	Recongizing the anatomy and physiology of the urinary system	Project Competence Assurance: "Urinalysis: An Educational Program," (ST)	Davidsohn and Henry: Clinical Diagnosis by Laboratory Methods; Halstead: The Laboratory in Clinical Medicine; The Ames Company: Urodynamics	
UP-2	Understanding the techniques of proper specimen handling		Davidsohn and Henry: Clinical Diagnosis by Laboratory Methods; The Ames Company: Urodynamics	
UP-3	Performing physical examinations of urine		The Ames Company: Urodynamics; Davidsohn and Henry: Clinical Diagnosis by Laboratory Methods	
UP-4	Performing routine chemical analysis of urine by dipstick		The Ames Company: Urodynamics; Davidsohn and Henry: Clinical Diagnosis by Laboratory Methods	
UP-5	Performing protein tests by turbidimetric methods		The Ames Company: Urodynamics; Davidsohn and Henry: Clinical Diagnosis by Laboratory Methods	
UP-6	Performing clinitests		The Ames Company: Urodynamics; Davidsohn and Henry: Clinical Diagnosis by Laboratory Methods	
UP-7	Performing microscopic examinations of urinary sediment		The Ames Company: Urodynamics; Davidsohn and Henry: Clinical Diagnosis by Laboratory Methods	

CURRICULUM AREA: MEDICAL LAB TECHNICIAN

TASK LISTING	INSTRUCTIONAL MATERIAL REFERENCES		
	Audiovisuals	Textbooks	Student Materials
IHP-1 Recognizing the importances of the immune process		Bryant: An Introduction to Immunohematology and Laboratory Immunology and Serology; Barrett: Basic Immunology and its Medical Applications	
IHP-2 Recognizing the basic theory of genetics		Bryant: An Introduction to Immunohematology and Laboratory Immunology and Serology; Medical Dictionary	
IHP-3 Screening donors for phlebotomy		AABB: Technical Manual; Bryant: An Introduction to Immunohematology and Laboratory Immunology and Serology	
IHP-4 Performing first aid for donor reactions		Bryant: Laboratory Immunology and Serology and An Introduction to Immunohematology; AABB: Technical Manual	
IHP-5 Drawing blood from donors		Bryant: An Introduction to Immunohematology and Laboratory Immunology and Serology; AABB: Technical Manual	

CURRICULUM AREA: MEDICAL LAB TECHNICIAN

TASK LISTING	INSTRUCTIONAL MATERIAL REFERENCES		
	Audiovisuals	Textbooks	Student Materials
IHP-6 Preparing special blood components		AABB: Technical Manual; Bryant: An Introduction to Immunohematology and Laboratory Immunology and Serology	
IHP-7 Organizing and storing blood		AABB: Techincal Manual	
IHP-8 Preparing blood for shipment		AABB: Technical Manual	
IHP-9 Preparing and reporting agglutination reactions for blood bank procedures		AABB: Technical Manual; Bryant: An Introduction to Immunohematology and Laboratory Immunology and Serology	
IHP-10 Performing ABO grouping		AABB: Technical Manual; Bryant: An Introduction to Immunohematology and Laboratory Immunology and Serology	
IHP-11 Performing Rh testing		AABB: Technical Manual; Bryant: An Introduction to Immunohematology and Laboratory Immunology and Serology	

CURRICULUM AREA: MEDICAL LAB TECHNICIAN

TASK LISTING	INSTRUCTIONAL MATERIAL REFERENCES		
	Audiovisuals	Textbooks	Student Materials
IHP-12 Perfomring direct and indirect Coombs test (Antiglobulin Test)		AABB: Technical Manual; Bryant: An Introduction to Immunohematology and Laboratory Immunology and Serology	
IHP-13 Performing antibody screening tests		AABB: Technical Manual; Bryant: An Introduction to Immunohematology and Laboratory Immunology and Serology	
IHP-14 Performing antibody identifications		AABB: Technical Manual; Bryant: An Introduction to Immunohematology and Laboratory Immunology and Serology	
IHP-15 Performing anitbody titers (dilution)		AABB: Technical Manual	
IHP-16 Crossmatching blood-compatibiligy testing		AABB: Technical Manual; Bryant: An Introduction to Immunohematology and Laboratory Immunology and Serology	
IHP-17 Performing Rg immune Globulin crossmatch		AABB: Technical Manual; Bryant: An Introduction to Immunohematology and Laboratory Immunology and Serology	

CURRICULUM AREA: MEDICAL LAB TECHNICIAN

TASK LISTING	INSTRUCTIONAL MATERIAL REFERENCES		
	Audiovisuals	Textbooks	Student Materials
IHP-18 Investigating transfusion reactions		AABB: Technical Manual; Bryant: An Introduction to Immunohematology and Laboratory Immunology and Serology	
IHP-19 Performing quality control procedures		AABB: Technical Manual; Bryant: An Introduction to Immunohematology and Laboratory Immunology and Serology	
IHP-20 Performing screening tests for syphilis		Bryant: An Introduction to Immunohematology and Laboratory Immunology and Serology; Bennett: Clinical Serology	
IHP-21 Performing febrile agglutination series		Bryant: An Introduction to Immunohematology and Laboratory Immunology and Serology; Bennett: Clinical Serology	
IHP-22 Performing rheumatiod arthritis test (RA)		Bennett: Clinical Serology; Bryant: An Introduction to Immunohematology and Laboratory Immunology and Serology	
IHP-23 Performing antistreptolysin "O" tests and titers		Bennett: Clinical Serology; Bryant: An Introduction to Immunohematology and Laboratory Immunology and Serology	

CURRICULUM AREA: MEDICAL LAB TECHNICIAN

TASK LISTING	INSTRUCTIONAL MATERIAL REFERENCES		
	Audiovisuals	Textbooks	Student Materials
IHP-24 Performing C-reactive protein (CRP) test		Bennett: Clinical Serology; Bryant: An Introduction to Immunohematology and Laboratory Immunology and Serology	
IHP-25 Performing slide agglutination test for mononucleosis		Bennett: Clinical Serology; Bryant: An Introduction to Immunohematology and Laboratory Immunology and Serology	
IHP-26 Performing slide and tube pregnancy test		Bryant: An Introduction to Immunohematology and Laboratory Immunology and Serology	
IHP-27 Performing cold agglutinin test		Bryant: An Introduction to Immunohematology and Laboratory Immunology and Serology	

CURRICULUM AREA: MEDICAL LAB ASSISTANT

TASK LISTING	INSTRUCTIONAL MATERIAL REFERENCES		
	Audiovisuals	Textbooks	Student Materials
HP-1 Recognizing proper anticoagulants		Hyun, Ashton and Dolan: Practical Hematology	
HP-2 Preparing and staining blood smears		Hyun, Ashton and Dolan: Practical Hematology	
HP-3 Performing cell counts		Hyun, Ashton and Dolan: Practical Hematology	
HP-4 Performing hemoglobin tests (Cyanmethemoglobin Method)		Hyun, Ashton and Dolan: Practical Hematology	
HP-5 Performing hematocrit tests		Hyun, Ashton and Dolan: Practical Hematology	
HP-6 Calculating erythocyte indices		Hyun, Ashton and Dolan: Practical Hematology	
HP-7 Performing erythocyte sedimentation rates (ESR)		Hyun, Ashton and Dolan: Practical Hematology	
HP-8 Performing erythrocyte osmotic fragility tests		Hyun, Ashton and Dolan: Practical Hematology	
HP-9 Performing reticulocyte counts		Hyun, Ashton and Dolan: Practical Hematology	
HP-10 Recognizing normal characteristics of erythrocytes		Hyun, Ashton and Dolan: Practical Hematology; Diggs: Morphology of Human Blood Cells	

CURRICULUM AREA: MEDICAL LAB ASSISTANT

TASK LISTING	INSTRUCTIONAL MATERIAL REFERENCES		
	Audiovisuals	Textbooks	Student Materials
HP-11 Recognizing normal characteristics of leukocytes	ASCP: "Granulocytic Identification," (ST)	Hyun, Ashton and Dolan: Practical Hematoloty; Diggs: Morphology of Human Blood Cells	
HP-12 Performing platelet counts and slide evaluations		Hyun, Ashton and Dolan: Practical Hematology; Diggs: Morphology of Human Blood Cells	
HP-13 Performing differential cell counts		Hyun, Ashton and Dolan: Practical Hematology	
HP-14 Recognizing characteristics of leukocyte disorders		Hyun, Ashton and Dolan: Practical Hematology; Diggs: Morphology of Human Blood Cells	
HP-15 Recognizing erythocyte disorders		Hyun, Ashton and Dolan: Practical Hematology	
HP-16 Performing sickle cell tests		Hyun, Ashton and Dolan: Practical Hematology	
HP-17 Performing lupus erythematosus (LE) tests		Hyun, Ashton and Dolan: Practical Hematology; Diggs: Morphology of Human Blood Cells	
HP-18 Performing peroxidase stains		Hyun, Ashton and Dolan: Practical Hematology; Diggs: Morphology of Human Blood Cells	

CURRICULUM AREA: MEDICAL LAB ASSISTANT

TASK LISTING	INSTRUCTIONAL MATERIAL REFERENCES		
	Audiovisuals	Textbooks	Student Materials
HP-19 Performing leukocyte alkaline phosphtase (LAP) stains		Hyun, Ashton and Dolan: Practical Hematology	
HP-20 Recognizing fundamentals of coagulation		Davidsohn and Henry: Clinical Diagnosis by Laboratory Methods	
HP-21 Performing prothrombin time tests (protimes)		Davidsohn and Henry: Clinical Diagnosis by Laboratory Methods	
Hp-22 Performing partial thromboplastin time		Davidsohn and Henry: Clinical Diagnosis by Laboratory Methods	
HP-23 Determining clotting times		Davidsohn and Henry: Clinical Diagnosis by Laboratory Methods	
HP-24 Performing bleeding times		Davidsohn and Henry: Clinical Diagnosis by Laboratory Methods	
HP-25 Recognizing principles of miscellaneous coagulation procedures		Davidsohn and Henry: Clinical Diagnosis by Laboratory Methods	

CURRICULUM AREA: MEDICAL LAB TECHNICIAN

TASK LISTING	INSTRUCTIONAL MATERIAL REFERENCES		
	Audiovisuals	Textbooks	Student Materials
CCI-1 Recognizing safety measures necessary to the clinical chemistry laboratory	NIH: "Nobody's Perfect," (MF)	ASCP: Laboratory Medicine, Vol. II, No. 9	
CCI-2 Performing quality control		Davidsohn and Henry: Clinical Diagnosis by Laboratory Methods; Tietz: Fundamentals of Clinical Chemistry	
CCI-3 Performing laboratory mathematics		Davidsohn and Henry: Clinical Diagnosis by Laboratory Methods; Tietz: Fundamentals of Clinical Chemistry	
CCI-4 Recognizing types of instrumentation	ASMT Education and Research Fund, Inc.: "Basic Concepts in Laboratory Instrumentation," (ST)	Lee: Elementary Principles of Laboratory Instruments	
CCI-5 Performing tests using Beer's law		Davidsohn and Henry: Clinical Diagnosis by Laboratory Methods; Tietz: Fundamentals of Clinical Chemistry	
CCI-6 Preparing calibration curves		Annino: Clinical Chemistry: Principles and Procedures; Davidsohn and Henry: Clinical Diagnosis by Laboratory Methods; Tietz: Fundamentals of Clinical Chemistry	

CURRICULUM AREA: MEDICAL LAB TECHNICIAN

TASK LISTING		INSTRUCTIONAL MATERIAL REFERENCES		
		Audiovisuals	Textbooks	Student Materials
CCI-7	Performing protein tests		Davidsohn and Henry: Clinical Diagnosis by Laboratory Methods; Tietz: Fundamentals of Clinical Chemistry	
CCI-8	Performing blood urea nitrogen (BUN) tests		Annino: Clinical Chemistry: Principles and Procedures; Davidsohn and Henry: Clinical Diagnosis by Laboratory Methods; Tietz: Fundamentals of Clinical Chemistry	
CCI-9	Performing creatinine tests		Annino: Clinical Chemistry: Principles and Procedures; Davidsohn and Henry: Clinical Diagnosis by Laboratory Methods; Tietz: Fundamentals of Clinical Chemistry	
CCI-10	Performing uric acid tests		Annino: Clinical Chemistry: Principles and Procedures; Davidsohn and Henry: Clinical Diagnosis by Laboratory Methods; Tietz: Fundamentals of Clinical Chemistry	
CCI-11	Performing glucose tests		Annino: Clinical Chemistry: Principles and Procedures; Davidsohn and Henry: Clinical Diagnosis by Laboratory Methods; Tietz: Fundamentals of Clinical Chemistry	

CURRICULUM AREA: MEDICAL LAB TECHNICIAN

TASK LISTING	INSTRUCTIONAL MATERIAL REFERENCES		
	Audiovisuals	Textbooks	Student Materials
CCI-12 Performing glucose tolerance tests (GTT)		Annino: Clinical Chemistry: Principles and Procedures; Davidsohn and Henry: Clinical Diagnosis by Laboratory Methods; Tietz: Fundamentals of Clinical Chemistry	
CCI-13 Performing bilirubin tests - direct and indirect		Annino: Clinical Chemistry: Principles and Procedures; Davidsohn and Henry: Clinical Diagnosis by Laboratory Methods; Tietz: Fundamentals of Clinical Chemistry	
CCI-14 Performing lipid tests		Annino: Clinical Chemistry: Principles and Procedures; Davidsohn and Henry: Clinical Diagnosis by Laboratory Methods; Tietz: Fundamentals of Clinical Chemistry	
CCI-15 Performing electrolyte tests		Annino: Clinical Chemistry: Principles and Procedures; Davidsohn and Henry: Clinical Diagnosis by Laboratory Methods; Tietz: Fundamentals of Clinical Chemistry	
CCI-16 Describing blood gas analysis		Annino: Clinical Chemistry: Principles and Procedures; Davidsohn and Henry: Clinical Diagnosis by Laboratory Methods; Tietz: Fundamentals of Clinical Chemistry	

CURRICULUM AREA: MEDICAL LAB TECHNICIAN

TASK LISTING	INSTRUCTIONAL MATERIAL REFERENCES		
	Audiovisuals	Textbooks	Student Materials
CCI-17 Performing enzyme tests		Annino: Clinical Chemistry: Principles and Procedures; Davidsohn and Henry: Clinical Diagnosis by Laboratory Methods; Tietz: Fundamentals of Clinical Chemistry	
CCI-18 Describing endocrine tests		Davidsohn and Henry: Clinical Diagnosis by Laboratory Methods; Tietz: Fundamentals of Clinical Chemistry	
CCI-19 Describing toxicology tests		Davidsohn and Henry: Clinical Diagnosis by Laboratory Methods; Tietz: Fundamentals of Clinical Chemistry	
CCI-20 Performing gastric analyses		Davidsohn and Henry: Clinical Diagnosis by Laboratory Methods; Tietz: Fundamentals of Clinical Chemistry	

CURRICULUM AREA: MEDICAL LAB TECHNICIAN

TASK LISTING	INSTRUCTIONAL MATERIAL REFERENCES		
	Audiovisuals	Textbooks	Student Materials
MP-1 Performing sterilization		Koneman: Color Atlas and Textbook of Diagnostic Microbiology	
MP-2 Preparing basic media		Bailey and Scott: Diagnostic Microbiology; Koneman: Color Atlas and Textbook of Diagnostic Microbiology	
MP-3 Performing proper specimen handling		Bailey and Scott: Diagnostic Microbiology; Koneman: Color Atlas and Textbook of Diagnostic Microbiology	
MP-4 Streaking plates		Bailey and Scott: Diagnostic Microbiology; Koneman: Color Atlas and Textbook of Diagnostic Microbiology	
MP-5 Performing initial plating of cultures on appropriate media		Bailey and Scott: Diagnostic Microbiology; Koneman: Color Atlas and Textbook of Diagnostic Microbiology	
MP-6 Preparing and staining slides by Gram stain method		Bailey and Scott: Diagnostic Microbiology; Koneman: Color Atlas and Textbook of Diagnostic Microbiology	
MP-7 Performing biochemical identification of pathogenic gram positive cocci		Bailey and Scott: Diagnostic Microbiology; Koneman: Color Atlas and Textbook of Diagnostic Microbiology	

CURRICULUM AREA: MEDICAL LAB TECHNICIAN

TASK LISTING		INSTRUCTIONAL MATERIAL REFERENCES		
		Audiovisuals	Textbooks	Student Materials
MP-8	Performing identification of gram positive rods		Bailey and Scott: Diagnostic Microbiology; Koneman: Color Atlas and Textbook of Diagnostic Microbiology	
MP-9	Performing biochemical identification system on gram negative cocci		Bailey and Scott: Diagnostic Microbiology; Koneman: Color Atlas and Textbook of Diagnostic Microbiology	
MP-10	Performing biochemical identification system on a gram negative rod		Bailey and Scott: Diagnostic Microbiology; Koneman: Color Atlas and Textbook of Diagnostic Microbiology	
MP-11	Performing identification of gram negative coccibacillus		Bailey and Scott: Diagnostic Microbiology; Koneman: Color Atlas and Textbook of Diagnostic Microbiology	
MP-12	Performing antibiotic susceptibility test		Bailey and Scott: Diagnostic Microbiology; Koneman: Color Atlas and Textbook of Diagnostic Microbiology	
MP-13	Processing T.B. specimens for inoculating		Bailey and Scott: Diagnostic Microbiology; Koneman: Color Atlas and Textbook of Diagnostic Microbiology	
MP-14	Processing anaerobic bacteria		Bailey and Scott: Diagnostic Microbiology; Koneman: Color Atlas and Textbook of Diagnostic Microbiology	

CURRICULUM AREA: MEDICAL LAB TECHNICIAN

TASK LISTING		INSTRUCTIONAL MATERIAL REFERENCES		
		Audiovisuals	Textbooks	Student Materials
MP-15	Preparing and staining slides by india ink method		Bailey and Scott: Diagnostic Microbiology; Koneman: Color Atlas and Textbook of Diagnostic Microbiology	
MP-16	Preparing parastological "wet prep" slides		Bailey and Scott: Diagnostic Microbiology; Koneman: Color Atlas and Textbook of Diagnostic Microbiology	
MP-17	Performing cellulose tape techniques		Bailey and Scott: Diagnostic Microbiology; Koneman: Color Atlas and Textbook of Diagnostic Microbiology	
MP-18	Preparing malaria smears		Bailey and Scott: Diagnostic Microbiology; Koneman: Color Atlas and Textbook of Diagnostic Microbiology	
MP-19	Performing germ tube test		Bailey and Scott: Diagnostic Microbiology; Koneman: Color Atlas and Textbook of Diagnostic Microbiology	

TEXTBOOKS

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AUDIOVISUALS

American Society of Clinical Pathologists	Slides
National Audiovisual Center	16mm film
Project Competence Assurance	Slides

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Ferris, Elvira and Skelley, Ester, Body Structure and Function. New York: Delmar, 1979.

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Brown, Barbara, Hematology: Principles and Procedures (3rd ed.). Philadelphia: Lea and Febiger, 1980.

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Finegold, Sidney, Diagnostic Microbiology: A Textbook for the Isolation and Identification of Pathogenic Microorganisms. St. Louis: C.V. Mosby Company, 1978.

RESOURCES ADDRESSES

American Association of Blood Banks
1828 "L" Street, N.W.
Suite 608
Washington, DC 20036

American Society of Clinical Pathologists
Publications Department
P.O. Box 11270
Chicago, IL 60612

American Society for Microbiology
1913 "I" Street, N.W.
Washington, DC 20006

C.V. Mosby Company
11830 Westline Industrial Dr.
St. Louis, MO 63141

Delmar Publishers
Division of Litton Educational Publishing Inc.
50 Wolf Road
Albany, NY 12205

F.A. Davis Company
1945 Arch Street
Philadelphia, PA 19103

John Wiley and Sons, Inc.
605 Third Avenue
New York, NY 10016

Lea and Febiger
Washington Square
Philadelphia, PA 19106

Lippincott Learning System
Health Professions Publications
East Washing Square
Philadelphia, PA 19105

Little, Brown and Company
34 Beacon Street
Boston, MA 02106

National Audiovisual Center
National Records Service
General Service Administration
Order Section CF
Washington, DC 20409

Pergamon Press, Inc.
Maxwell House
Fairview Park
Elmsford, NY 10523

Project Competence Assurance
P.O. Box 209
Cambridge, MA 02138

Reston Publishing Company
11480 Sunset Hills Road
Reston, VA 22090

W.B. Saunders Company
Subs of Columbia Broadcasting System
West Washington Square
Philadelphia, PA 19105

Thomas Publishing Company
1 Penn. Plaza
New York, NY 10001

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APPENDIX B

Special Needs

WORKING WITH SPECIAL NEEDS STUDENTS*

Introduction

Special needs population students are those who are designated as handicapped or disadvantaged. The 1976 vocational education amendments define handicapped individuals as:

> Persons who are mentally retarded, hard of hearing, deaf, speech impaired, visually handicapped, seriously emotionally disturbed, orthopedically impaired, health impaired, or persons with other specific disabilities, who by reason thereof require special education and related services and who cannot succeed in the regular vocational education programs.

In those same amendments disadvantaged persons are defined as:

> Persons (other than handicapped persons) who have academic or economic disadvantages and who require special services, assistance or programs in order to enable them to succeed in vocational education programs.

Federal legislation requires that these special needs population students be given an opportunity to function in regular vocational education programs (Essentially, this is what is meant by the term mainstreaming.). This section provides information on how such students are identified and how they can be mainstreamed into regular vocational education environments.

Figure One presents a conceptual model depicting various activities of the process in identifying and mainstreaming special needs students in vocational education. These activities

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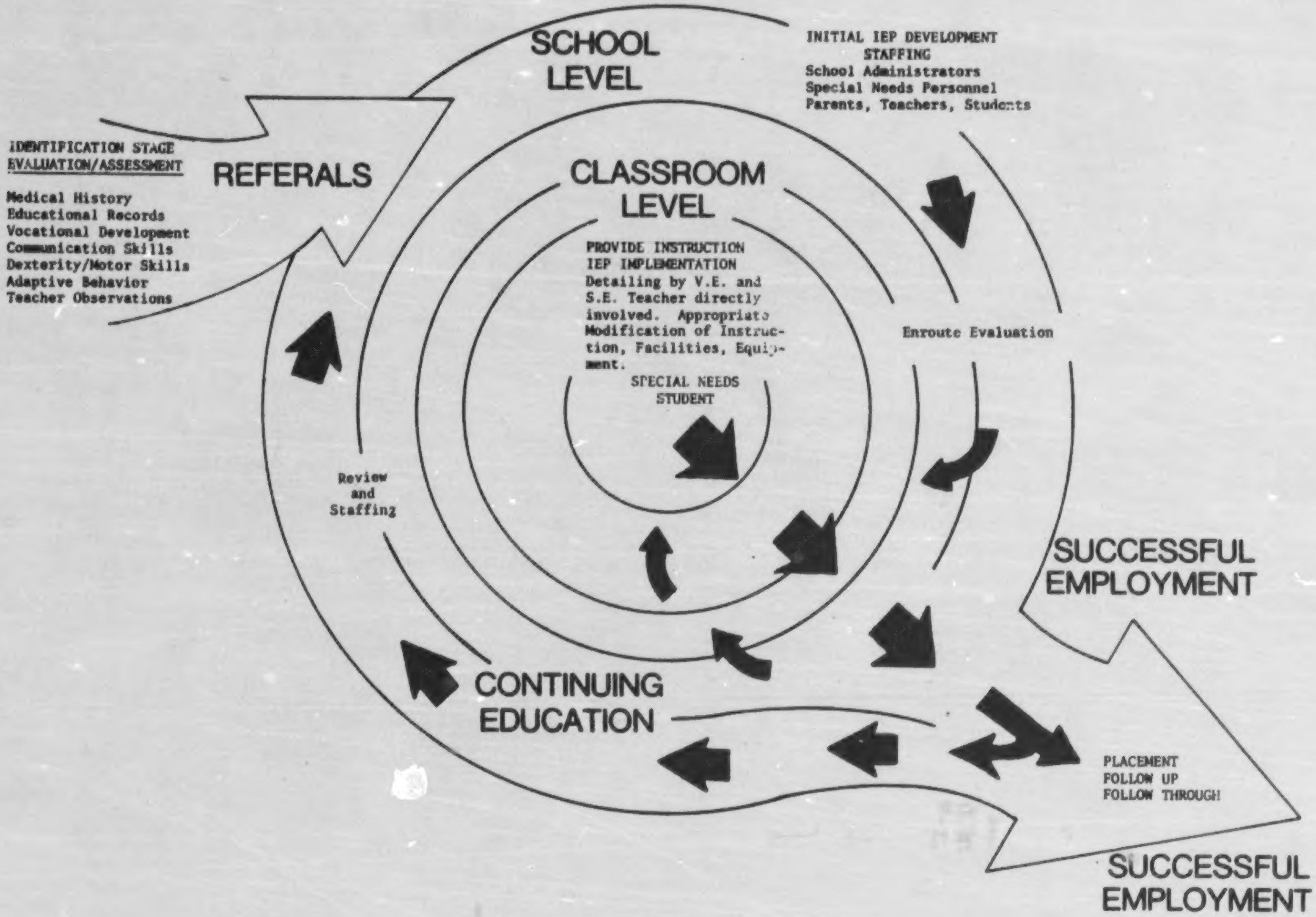
THE CONCEPT OF MAINSTREAMING


SCHOOL LEVEL
INITIAL IEP DEVELOPMENT
STAFFING
School Administrators
Special Needs Personnel
Parents, Teachers, Students
IDENTIFICATION STAGE
EVALUATION/ASSESSMENT
Medical History
Educational Records
Vocational Development
Communication Skills
Dexterity/Motor Skills
Adaptive Behavior
Teacher Observations
REFERALS
CLASSROOM LEVEL
PROVIDE INSTRUCTION
IEP IMPLEMENTATION
Detailing by V.E. and S.E. Teacher directly involved. Appropriate Modification of Instruction, Facilities, Equipment.
SPECIAL NEEDS STUDENT
Enroute Evaluation
Review and Staffing
SUCCESSFUL EMPLOYMENT
CONTINUING EDUCATION
PLACEMENT
FOLLOW UP
FOLLOW THROUGH
SUCCESSFUL EMPLOYMENT

are conducted at three levels: the community level, the school level (Career Development Center) and the classroom level. All three levels must work together if implementation of the process is to be effective.

Identification of the Special Needs Student

Through a variety of pre-testing procedures, special needs students are identified and their potentials are evaluated at the community level. This evaluation process consists of collecting and assessing the following data for each student:

-Medical History
-Educational Records
-Vocational Development
-Communication Skills
-Dexterity/Motor Skills
-Adaptive Behavior
-Teacher Observations

When this procedure has been completed, the community personnel refers the student to the appropriate school level personnel. As a part of the referral and school intake process, an Individualized Educational Plan should be initiated.

> The Individualized Educational Plan (IEP) is exactly what its name implies--a plan for the education of a specific individual. The base content of the IEP is outlined in Public Law 94-142. According to that outline, the IEP must include at least the following information: (a) student's present level of functioning, (b) his/her long range instructional objectives, (c) his/her short-range instructional objectives and finally, (d) some criteria to determine that those objectives have been achieved.

Development of the Individual Education Plan

It would be very difficult to anticipate the exact kind or type of special needs students one might find in an Medical Laboratory Technician program at any one time. The terms disadvantaged and handicapped are really "catch-all" terms that indicate a wide assortment of problems that might occur in a student representing one of these populations. In addition to the lack of a specific definition and the fact that the typical vocational instructor has had very little preparation in working with these students, it becomes clear that you will need a basic plan to use in meeting their occupational preparation needs. The following steps can serve as your basic planning procedure for mainstreaming a special needs population student into your curriculum.

The first step occurs after you have been notified that a special needs student can profit from being in your vocational program. When you have received that notification, you should contact your coordinator of student personnel services and ask for a detailed report of the student's assessed status. Note the word assessed; it is critical. Through a formal assessment status, appropriate school personnel and community should have identified the student's strengths and weaknesses as well as the specific handicapping conditions. After you have received the assessment information and understand it you are ready for Step Two.

Step Two, developing (or completing) the vocational aspects of the Individual Education Plan-IEP, is usually performed for handicapped students only; however, it has just as much merit for the disadvantaged. The IEP is a very useful tool. It should be considered the description of what you expect that student to be able to do when he or she completes your course and how you will provide the learning experiences to assure that those expected outcomes will be achieved. Be sure that you keep this IEP in a convenient place and use it.

The IEP is usually developed through group activities called staffings. Staffings may be held as often as needed and can be used to modify the IEP as the student moves through the program. When a student is about to be mainstreamed into your curriculum, you must become involved in the staffing sessions that will develop the vocational aspects of the IEP. IT IS YOUR RIGHT AND YOUR DUTY, therefore, your being present during the staffings is imperative. The special education personnel can present the student's interests, strengths and limitations. However, only you, the vocational instructor, can relate these to your program. This means that the final statement of the job (DOT) and the task level (short term) objectives are primarily defined by you the vocational instructor.

In Step Three the IEP will first be used to suggest how the curriculum and/or the facilities can be modified to accommodate the special needs population student. Modifying the curriculum means that in most cases special adjustments will have to be made in the student materials and that special instructional strategies will need to be developed. When you say modify the curriculum you are not suggesting that the content be "watered down" - you are proposing alternate ways to teach the proper/required content. REMEMBER! ALL VOCATIONAL EDUCATION PROGRAMS ARE BASED ON REAL JOBS THAT HAVE THEIR OWN TASKS AND STANDARDS. AS FAR AS YOU ARE CONCERNED, YOU HAVE NO POWER TO CHANGE THESE. YOU ALSO CANNOT SUCCESSFULLY CREATE A WHOLE NEW JOB.

Modification of facilities and equipment is a concern when working with the phyically handicapped. Be reminded that by law your school building must already meet requirements of accessibility to all handicapped persons--especially those who are blind or are confined to wheelchairs. Your chief concern is to be sure that your classroom and laboratory will allow the handicapped students to be comfortable and above all to learn. You will also need to make certain modifications that will enable handicapped students to properly and safely use the "tools and equipment of the trade". It is foolish to think that you would have a ready answer for all or any particular one of these physical handicaps--call on the experts. Vocational rehabilitation counselors and other staff have been concentrating on these problems for many years. They should be able to offer a number of positive suggestions. A combination of VR experience and instructor creativity can and has produced outstanding results.

As we think about curriculum modification it would help to review some general learning needs of this population.

> The educationally mentally retarded will constitute a major population now entering vocational education. The key concept to remember in modifying the curriculum for this population is that they require much more detail in order to learn and they require a great deal more practice time. All curriculum modifications for these groups should be made by detailing each task or objective into its smallest parts and by providing for more and more practice.
>
> The hearing and visually impaired can be accommodated by common sense and the use of supporting resource personnel. Neither of these groups reads well or learns from reading as a primary mode. This should be accounted for in modifying the curriculum, i.e., larger print, brail and recordings for the blind and captions on visual materials, seating arrangements, use of notes from a classmate, lower reading level textbooks, oral testing and total communications for the deaf.

The orthopedically handicapped usually require attention to facilities and equipment. Beyond that, their learning needs are as varied as those of the normal population. Remember, some of these individuals will actually be highly gifted in their chosen field. Their major needs will be psychological and coping with the school environment.

The disadvantaged are physically and mentally capable of learning, but their background has not allowed them to fully develop the discipline and cognitive skills (i.e., vocabulary, math, etc.) required to master occupational preparation courses. They have also developed an anti-school attitude that complicate many efforts to modify the curriculum for them. Usually their success in the vocational program is contingent on either a good pre-vocational program or a supporting academic program.

Step Four requires that instructional strategies be selected. These strategies may be many and should be varied. They should reflect the best learning technique for a given student and his or her chosen occupation. Some examples of instructional strategies are discussed below.

Teacher demonstration: Simply show the student how the job is to be done in clear distinct steps.

Peer demonstration: This technique allows the instructor to use one of the advanced students to demonstrate a particular task in a step by step fashion. It is a flexible system. For example, you can use peer demonstration to show each task step while you explain them to the students. When working with the mentally retarded, you will never have enough time to demonstrate a task as often as they may need to see it. In such situations, the well prepared advanced student can perform and explain the same demonstration several times.

Shadowing: Shadowing can be used in conjunction with demonstrations. By shadowing, the student is allowed to do exactly what the demonstrator does. This allows the student to learn in a see and do fashion. The student may shadow the instructor, an advanced peer or in some instances the worker on the job.

Job site visits: Job site visits offer the student an opportunity to see the work being done in its natural location. Students can develop a worker identify a realistic view of how the tools, equipment and materials are brought together to produce the product.

Work group or team: By being a part of a work team, the student can learn the various roles in an occupation as having the opportunity to practice specific sets of skills under the tutelage of peers.

Individualized instruction: Appropriately prepared or adjusted individualized instruction is a big help in managing a class that contains a mixture of special needs population students and "norm group" students. Individualized instruction, no matter what the source, will require much developmental input from the instructor. In most all cases, however, the results are worth the effort.

Media: Many of the special needs populations require mediated instruction (i.e., hearing and visually impaired), however, the use of appropriate media enhances learning for all students. Media can range from a line drawing in an instructional module, to a video tape, to posters and charts. It can be instructor made or commercial. All that matters is that it exactly links to the objective.

Project Method: The value in using projects with special needs population students is that they help them mentally and physically unify all the parts into a uniform whole. Because of the detail required for them to learn, they need learning activities that relate all of the parts to the whole. The development of a product through an assigned project is an ideal integrating experience.

Simulations: Simulations meet a variety of instructional needs. One of the more important with special needs population students is providing the opportunity to develop proper safety concepts before actually working with the "live" equipment that could be dangerous to a careless student.

Role playing: Role playing is a part of several other instructional strategies. On its own, it is a very good procedure for developing the attitudes and values required of a successful worker-i.e., a sense of responsibility, the ability to take orders and follow directions, interpersonal skills and so on. It is a way to concentrate on developing good work habits and positive attitudes.

Peer instruction: Like peer demonstrations, peer instruction is able to multiply the instructor's available time. This allows individual students with specific needs to have more assistance. Peer instruction has values beyond expanding time; it is an excellent approach to learning. In almost every situation, both the peer teacher and the peer student profit from the exchange. In operation peer instruction is simply a matter of preparing and allowing one of the advanced students to teach small groups certain segments of a course.

Team teaching: As we have already noted, some special needs populations require a combination of vocational and special education presented in harmony. A team approach is the only way to meet that need. For team teaching to be effective, clarification of student needs (as defined by the IEP) and careful planning will be required.

Peer apprenticeships: The peer apprenticeship is an ideal way to induct the new special needs population student into the curriculum. By serving as the apprentice to an advanced student, the special needs population student can become climatized to the laboratory/shop and can begin to learn the tools, equipment and materials of the program. The shadow technique can also be added to increase hands-on learning.

Assessment and feedback: Student learning can be improved by frequently assessing students' skills and feeding back their strengths and weaknesses. Through a process of positive feedback, the student can be moved gradually from where he or she is to the level of skill required.

These instructional strategies can be used independently or in various combinations. This brief list is meant only to provide you with some suggestions, there are no doubt many other techniques that could be used. The creative instructor will be constantly innovating to meet the needs of particular students.

Implementing the IEP

Step Five is a matter of putting the vocational aspects of the IEP into operation. The activation of the IEP initiates the student into the vocational education program and allows him or her to progress through the modified curriculum at his or her optium rate. There should be frequent assessment activities that indicate where the student is relative to the IEP objectives. If problems are detected, a staffing should be conducted to re-evaluate the IEP and continue the process in a fashion that is most beneficial to the student.

Step Six will take the student to his or her next logical step of either totally exiting the system or recycling into a continuing education mode. In most cases, the student will do some of both--getting a job and periodically accessing the continuing education component of the educational system to refine existing skills or to broaden his or her capacity.

The ultimate goal of all this effort is not employment-rather it is "successful employment". Successful employment implies that not only is the student placed in a job, but that the student is able to sustain himself or herself in a working environment over an extended period of time.

Evaluation

Evaluation of the student's program is a critical step. Through that process we not only help the current student, but we are able to gather information that will improve our potential to help students with similar difficulties in the future. A well rounded evaluation system should consist of the following activities:

-En-route evaluation (formative) to monitor the student's progress through the program.

-Summative evaluation upon completion of the program to determine job readiness.

-Follow-up after placement to determine if the student is successful on the job.

-Follow-through activities designed to identify any further training needed, which may be indicated by the follow-up procedure.

RESOURCES

In recent years, mainstreaming of special needs population students has been an area of great concern to vocational educators. The overall result of that concern is an abundance of well developed resource materials and a variety of personnel with special skills in working with these groups. In the space allowed by this curriculum guide, it would be impossible to present an adequate set of methods and procedures for solving the problems of students with special needs, but if the vocational eduction administrator and instructor will judiciously use the human and material resources listed here, much of the in-depth information required for the special and unique cases that will occur can be compiled from these sources.

Support Personnel or Systems

As was noted earlier, you the vocational instructor, simply do not have sufficient skills to work with special needs population students alone. There are too many different student problems to ever allow an instructor to deal with them all on a "come as you are" basis. For that reason, you must make yourself aware of the variety of support systems and personnel that are available to you and to the students. A few of these are listed here. These specialists can lead you to others on an as needed basis.

County Health Department - Many of your special needs population students will need some medical and dental assistance. The county health facility is an excellent referral source for these problems.

Special Education - Through local boards of education there are a variety of special education personnel available locally, regionally and from the State Department of Education. The vocational education administrator can obtain assistance from these specialists through the local superintendent's office.

Project SERVE - Project SERVE is a statewide effort to acquire materials and to cultivate expertise in providing vocational education to disadvantaged. Project Serve can be contacted by the area vocational-technical director or the vocational supervisor.

Vocational Rehabilitation - Vocational rehabilitation is a highly developed organization whose major focus is all dimensions (such as: diagnosing, training, job placement and counseling) of the handicapped population. Within that network is a vast pool of expertise. You can contact it through the area vocational rehabilitation counselor who calls on your school or through a designated school official such as the coordinator of student personnel services or Career Development Center personnel.

Office of Student Personnel Services - In the area vocational-technical school, this is the key group as far as students and student needs are concerned. They can provide a variety of services to you and to your students. Many of the contacts with community agencies have already been made by this group-that alone will save the instructor much time.

Career Development Center - Each area vocational-technical school has a Career Development Center designed to meet the very special needs of incoming disadvantaged and handicapped students. The CDC staff is available to assist the instructional staff with a wide range of services for the special needs student populations.

All of the resources and resource personnel listed here are a part of the team. The best results can be obtained by using as many of these people and their support systems as possible from the beginning. In some situations, you will miss a resource in the beginning or the student's needs change. When that occurs do not hesitate to call on the appropriate experts for additional help. As a matter of fact, the rule of thumb that has always been used in the "helping professions" is to go as far as you can, then refer. Do not hesitate to call for help. Most of these service groups are funded to support "your" student. If you do not use them, they fail in their mission and you fail in yours.

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APPENDIX C

Definition of Terms

DEFINITION OF TERMS

1. A/Vs-Audiovisuals - May refer to any picture and/or sound media. (ie. slides, tapes, filmstrips, 16 mm films, etc.)

2. Checkpoint - A student-instructor interface point wherein the instructor may give the student a test, perform a demonstration, or simply provide the student with additional needed information or instructions. Also a checkpoint may be used for motivational purposes.

3. Competency - The ability (knowledge, skills and attitudes) to perform all of a group or cluster of related tasks required to complete a designated activity according to occupational standards. In the educational setting, the statement of a competency includes expected student outcomes in terms of knowledge, skills and attitudes required to complete a designated activity as defined by incumbent workers according to the standards of the work place.

4. Course - A grouping of tasks and competencies which have a common knowledge base or are within a given domain.

5. Criterion-Referenced Measure - An exercise based upon a performance objective, the accomplishment of which measures attainment of that objective.

6. Criterion-Referenced Test - A test designed to measure student competencies based on job or industrial standards.

7. Curriculum Guide - A document containing the objectives, content, organization and structure of an instructional program. It is designed for use by administrators, instructional supervisors and teachers.

8. D.O.T. - Abbreviation for Dictionary of Occupational Titles. Document provides nine digit codes identifying each occupation.

9. Duty - One of the distinct major activities involved in the work performed. A Composition of related tasks.

10. Exit Point - A pre-determined point within an instructional program in which a student may exit with the essential competencies for a specific job. Usually defined in terms of D.O.T. codes and/or O.E. codes.

11. "Hands-On" - Statement implying the student is physically involved in a learning activity.

12. Individualized Instruction (I.I.) - A system of instruction allowing a student to progress at his/her fastest rate.

13. Job - A specific area of specialization within an occupational field consisting of several closely related duties for which a person would expect to receive remuneration. Should be identified by DOT code.

14. Job Sheet - (Or Operations Sheet) - A project of a performance nature. Generally performed by the student in a lab or shop type environment or in a specialized work area.

15. Live Work - Generally refers to items brought into the course area for repair or adjustment. Examples of live work might be automobiles, radios and TV's, air-conditioners, etc. Another form of live work would be patrons visiting the cosmetology department to receive permanents or other services.

16. Master Copies - Original copies of slides, tapes or written materials set aside for the purpose of duplication.

17. Occupational Cluster - A group of occupations sharing a common core of competencies. Georgia's comprehensive high school vocational program is organized around this concept.

18. Occupational Inventory - A listing of tasks to be performed in a particular occupational area, grouped under duty classifications.

19. O.E. - Refers to the U.S. Office of Education. O.E. codes are a classification system (taxonomy) for occupational education programs.

20. Open Entry - Term meaning that a student may enter the program at any time and does not have to wait for quarter or semester breaks.

21. Open Exit - Term meaning that a student may leave a program any time he/she completes occupational objectives.

22. Performance Guide - A series of steps arranged in a sequence which when completed may result in the performance of a task. Also called teaching steps.

23. Performance Objective - A statement in precise, measurable terms of a particular behavior to be exhibited by a learner underspecified conditions. It possesses each of the elements or characteristics specified below:

    a. Condition - The testing situation confronting the learner is clearly specified. This includes equipment provided or withheld, environmental constraints such as temperature, space, etc.

b. Performance - The specific behavior expected of the learner is stated.

c. Standard - The degree of acceptable performance is specified.

24. Performance Test - A test entailing not only the ability to answer questions, but measuring the student ability to operate, manipulate or perform a given task.

25. Program - An organized sequence of courses leading to an occupational objective. A program may contain one or more student exit points as defined by D.O.T. codes.

26. Program Objective - The outcome of a prescribed program of instruction. Usually expressed in terms of the occupation or job for which training is designed. D.O.T. codes are frequently used to identify program objectives or student exit points.

27. Self-Paced - Refers to a student moving through the prescribed training program at the fastest pace at which he/she can meaningfully learn.

28. Sequencing - Putting any set or series of learning activities or tasks into proper order or sequence. Normally arranged from simple to complex within groupings or blocks.

29. Software - Written or printed materials, slides, filmstrips, tapes, etc.

30. Student Manual - A document designed for use by students in a specific instructional program. It contains unit sheets, references, operational procedures, job sheets, etc.

31. Task - The smallest division of work in which a measurable output occurs. A logical and necessary step in the performance of a duty.

32. Task List - A listing of tasks performed by incumbent workers within a domain of interest. An example is a listing of all tasks performed by an automotive mechanic or by a worker in ornamental horticulture.

33. Unit - One "module" training material that generally covers one learning task and programmed on one unit sheet. May cover more than one lesson.

34. Unit Guide - A curriculum guide sheet that lists a task and objective with the instructional activities, instructional materials, evaluation and approximate time required for a student to successfully complete the task.

35. V'TECS Catalog - A comprehensive collection of performance objectives, performance guides, criterion-referenced measures and related data. Organized by a job structure or career ladder within a domain of interest.

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Title VI - Peyton Williams Jr., Associate Superintendent of State Schools and Special Services
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Section 504 - Jane Lee, Coordinator of Special Education

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